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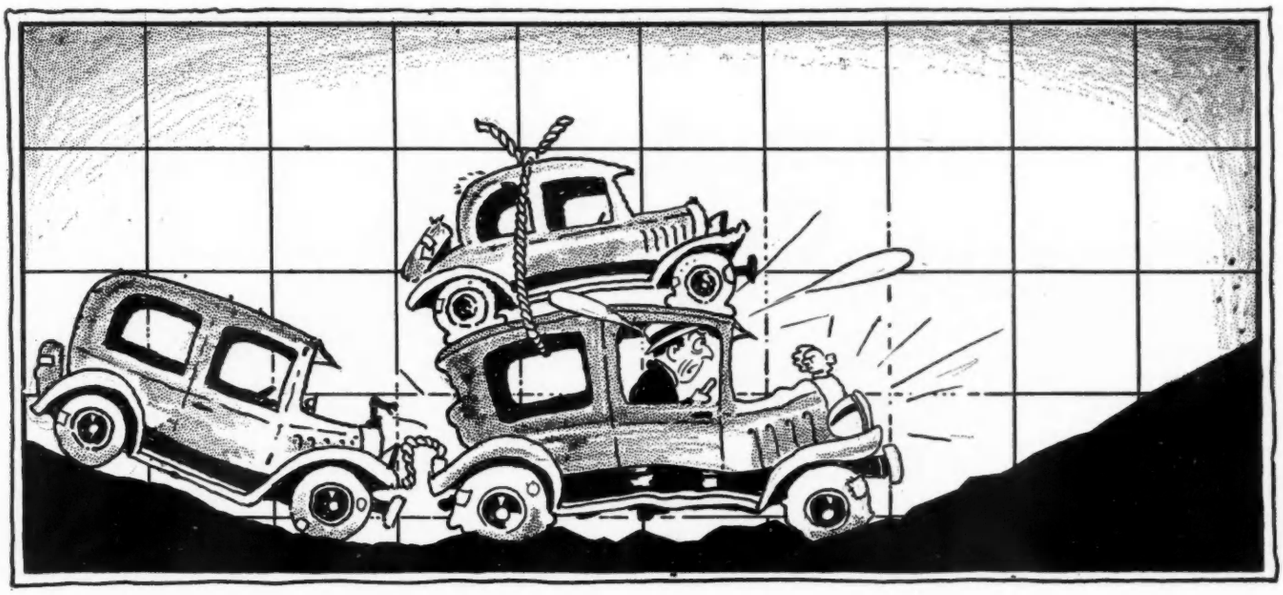


Profits From Used Cars Must Provide Impetus for Sound Dealer Progress

by Don Blanchard

THERE is no news, perhaps, in the statement that the used car continues to be the principal worry of the automobile dealer. That has been true for a great many years. But the problem is getting steadily more acute as the ratio of used to new-car sales climbs consistently upward, since used-car losses are a function of the volume of used cars handled.

Dealer attitude, however, toward the problem seems to be changing. There are still numerous dealers who are looking for some plan to lift them out of the used-car morass in which they have been sinking. Some of these think that the answer is to take the dealer out of the used business entirely; others that somebody should set up a schedule of used-car values to which everybody should adhere; and so on. On the other hand, there are an increasing number of dealers who are coming to the sounder conclusion that the used car itself must provide the additional gross profit they need to finance the growing amount of trading they are forced to do.

There is no doubt that dealer thinking, and eventually dealer action, along these sound lines could be greatly stimulated, if the manufacturers individually or as a group would come out clearly and emphatically for rational trading. Something more than a formal announcement of policy would be needed to make the move effective. Each subscribing manufacturer would have to impress upon and, if necessary, beat into his field force the fact that in making this move he meant business.

Essentially rational trading means getting enough gross profit out of combined new and used-car sales to cover the cost of selling them, with something over for net profit. Some simpler formula is needed, however, to grip the imagination of the trade. I suggest, "If you pay more for a used car in allowance and reconditioning cost than you sell it for, you are going broke." Or, briefly and bluntly, "Break even or go broke."

Like all generalities, this one won't apply in all cases. Due to discount, or other factors, some dealers may be able to follow a more generous trading policy and show a fair profit; others may find it necessary to show a gross profit on used cars. But if the rank and file of dealers could be brought to put

their trading on a break-even basis, the improvement in their financial standing would be tremendous.

After two years of famine, it would take real courage for manufacturers to get behind such a policy, as its effect unquestionably would be to curtail volume at least temporarily. But is there any alternative? Factories can't operate without dealers to sell their cars, and if present irrational trading continues some factories, at least, are going to find themselves dealerless. In fact, there are already indications that the shrinkage in dealers from 1929 levels is quite likely to exceed 30 per cent.

It may be argued that it is all right to talk about putting trading on a rational basis, but how can it be made to stick? It can't, 100 per cent. Nevertheless, contact with dealers indicates that the trade has never been in so receptive a mood to such a policy as at the present time. If, in every contact with the factory and its field men, the dealer was impressed with the fact that sales were not wanted which only wild trading would get, the moral effect would be far-reaching. It would stiffen the dealer's backbone and increase his loyalty to his factory.

Some factories appear to be moving in this direction. Recently I sat in on a meeting of dealers at which a national sales contest was inaugurated. After the detail of the contest had been explained, the zone manager got up to make the final inspirational talk, but in closing he said—and he shouted for emphasis: "We want and expect this contest to sell plenty of cars. But don't trade your shirts to get the business. Remember, the policy of the company is PROFIT BEFORE VOLUME!"

Of course, the used-car problem is not wholly one of buying. In fact, it is perhaps true, as one factory used-car expert says, that 80 per cent of the dealers are not doing the ordinary things to sell used cars. But improving dealer merchandising methods will take a long process of education. It will also take time to put trading on a rational basis. But the possibility of some immediate progress seems greater via the rational trading route.

Rational Trading Fundamental to Success

As has been pointed out, an increasing number of dealers are recognizing that rational trading is fundamental to their success. On the other hand, too many of them feel that the factories don't give a damn how they trade, so long as they sell the cars. If any factory still feels that way, it is time it got over it and let its dealers know in a convincing way that it is past that stage.

One phase of the used-car problem that perhaps is giving dealers as much concern at the present time as any other is the steady increase in the ratio of used to new-car sales. For the country as a whole it is not improbable that this year dealers will sell two used cars for every new one. What can be done to stop the steady rise in this ratio?

One thing is to quit trading so many one-year-old cars. Such cars necessarily have to be taken in at relatively high prices, and in order finally to liquidate the investment, two, three and sometimes more subsequent trades are necessary. Many dealers are not at all averse to trading these one-year-old cars, as they often represent nice, clean, fast-moving stock. The trade-downs which must be accepted on them, however, are often not so nice, or so clean, or so fast moving. Some dealers have recognized the effect of high-priced trades on their used to new sales ratio and their used-car losses, and refuse to take them except at their own figure. One small dealer has adopted the following rule for his own guidance: Used cars valued at over $500 must be traded at a figure that will show a gross profit; from $300 to $500, the car must be traded on a break-even basis; under $300, a small gross loss may be accepted, as on such deals the possibility of a further loss on trade-downs is minimized.

At this stage of its development, the industry should be able to build cars that would keep the typical owner satisfied for two years at least. Hence a general warning to lay off the high-priced used cars, unless they can be obtained at the dealer's own figure, might help to put the brakes on the steady rise in the trading ratio and thus tend to limit used-car losses.

Dealers Employ Too Many Salesmen

The salesman problem naturally has been intensified by the curtailed volume which depression has brought. The crux of the difficulty seems to be that there are too many selling cars. Any dealer can figure out fairly accurately about what portion of his gross profit he can pay to salesmen. He should be able to estimate about how much he has to pay the type of man he wants, to keep him satisfied. A simple arithmetical operation should give him the answer of how many salesmen he can have. Apparently few dealers have approached the problem from this angle, and many of those who have, have not had much encouragement from the factories. One big city dealer told me recently that the factory budgeted his salesmen's compensation at $17,000 and recommended that he have 15 salesmen. He followed their advice and he had a salesman's problem, as might be expected. Somebody ought to give some attention to finding out how many salesmen are enough.

Two important things that the depression has taught dealers are the importance of low overhead and the necessity for making the non-car-selling departments of the business operate at a profit. There is no doubt now that when the crash came the retail end of the business was overorganized. In many cases rents were excessive and non-productive payrolls badly swollen. Much of the excess has been squeezed out in the last two years, although some of the monuments erected during the boom days, often with factory approval, unfortunately have turned out to be sepulchres.

Dealers generally recognize the need for cutting fixed expenses and they have cut millions out of them. More will be pruned out when present leases expire and come up for renewal. So far as non-productive payrolls are concerned, the business has been pretty well "detitlized," and dealers themselves are doing many of the jobs which they formerly thought they had to have executives to do.

As the industry rebuilds its dealer organization, the importance of holding fixed expense to a minimum should be given continuous consideration. A fixed expense set-up that will enable dealers to get by on 50 per cent of normal volume, or thereabouts, would put them in a sound position to weather any storm. In the smaller towns, and to a certain extent in the bigger cities, this will mean an increase in the number of dealers handling more than one

line of cars. In fact, a noticeable development in this direction already is taking place.

Service profits have been a lifesaver to many dealers during the depression, and as their importance has become more generally appreciated, more dealers have put pressure on this end of their businesses. To illustrate what can be accomplished in this direction, I talked recently to a West Virginia dealer whose average sales amounted to about 23 cars per month. But because of the income he has been able to develop in his non-car departments, he can break even on six cars per month. And if his tire business keeps growing as he has reason to expect that it will, he will be able to get by, as he puts it, on "minus two cars a month." What a swell position he is in to trade used cars on a sound basis! Yet he hasn't abused his position from the factory standpoint, as his car volume is satisfactory. Maybe the solution of the used-car problem lies in part, at least, in the service department.

Certainly a dealer who is able to pay all of his fixed expenses out of his service department revenue is in a strong position. An operating control form which General Motors has been introducing recently, and which its dealers have received enthusiastically, seems to recognize this point. At the top of this form the dealer's fixed expense is set down—that is all of his operating expenses which go on whether he makes a sale or not. Underneath this item is entered what is called the fixed gross profit, which consists of the gross profit derived from the service and parts departments. The difference between the fixed expense and the fixed gross profit obviously represents what new-car sales have to make up. Next is set down the variable expense per car sold which, divided into the balance of the fixed expense, gives the number of cars which must be sold to break even. This form brings the dealer's new-car sales task to a focus and at the same time it emphasizes the importance of building up the fixed gross profit—that is, the gross profit derived from parts, service, etc. Its usefulness from the control standpoint is, of course, obvious.

Incidentally, I asked a number of dealers recently what they would think about getting out of the parts business entirely, or practically so, and instead depending on local parts jobbers who would sell to them at a suitable discount. I rather expected that sentiment would be almost unanimous against such a move, but I was surprised to find that about half of the dealers queried thought it would be a good idea as it would relieve them of the obsolescence and stockkeeping burdens.

There is no doubt that inadequate liquid capital is handicapping the operations of many dealers in the race for net profit. In fact, trying to make a limited amount of capital stretch too far is one of the basic causes of dealer distress, as it almost inevitably leads to costly sacrifice merchandising. A dealer should have enough liquid capital to finance his normal volume, and if he has it he will have no difficulty getting bank credit to carry him over the seasonal peaks. It is because the dealer too often fails to measure up to this standard, and not because of any deep-seated prejudice against the business, that banks have curtailed dealer credit.

The capital simply is not in dealer businesses. Moreover, outside capital does not appear to be particularly anxious to remedy this condition. The only way out seems to be to get present dealerships on a profitable basis so that some of the earnings can be plowed back into the business until liquid capital has been brought up to a level that will again make the dealer a welcome visitor at his bank.

And if this building-up process is to get any place, manufacturers will have to consider not only market potentialities but also available capital in gaging the efficiency of its dealers. In other words, an inadequately capitalized dealer should not be expected to realize as fully on the potential of his territory as a properly capitalized one. In fact, he should be urged to let his volume grow with his capital and to wait to get maximum sales penetration until his capital structure was strong enough to support the business. Sounds perhaps rather idealistic for these days of intense competition. But it looks as though factories might be forced into this viewpoint if they don't take it voluntarily.

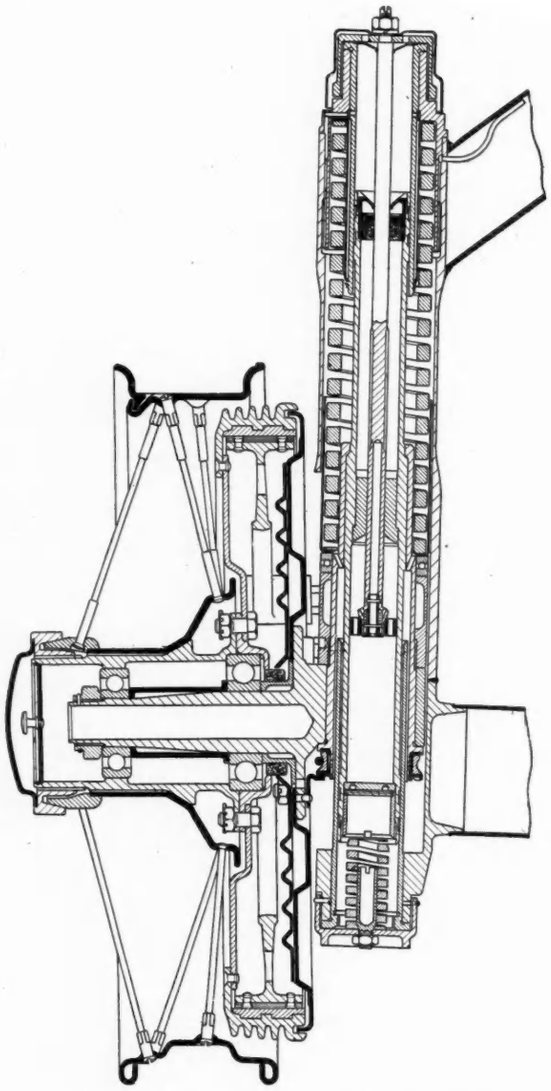
Effect of Supercharging Aircraft Engines Investigated

IN a news article on automotive activities at the Bureau of Standards in Washington, which appeared in these columns last summer, mention was made of an investigation on the effect of supercharging on the behavior of aircraft engines, which was conducted in the altitude laboratory. A report on this research work has now been published (Report No. 384 of the National Advisory Committee for Aeronautics, The Comparative Performance of Superchargers, by Oscar W. Schey).

The results of the investigation show that for critical altitudes below 20,000 ft. there is a maximum difference of about 6 per cent between the amounts of net engine power developed by the various types of superchargers when ideal methods of control are employed, but for critical altitudes above 20,000 ft. an engine develops considerably more power when equipped with a turbo-centrifugal supercharger than with any other type. The Roots type gives the lowest net engine power of all at high critical altitudes, because it has the least efficient type of compression. The critical altitude, it may be explained, is the altitude up to which ground level horsepower can be maintained.

The throttling method of control used on the geared centrifugal type of supercharger is very unsatisfactory at low altitudes from a net-engine-power standpoint, when compared with the method used on the Roots or turbo-centrifugal.

In regard to mechanical limitations, the geared centrifugal has the advantage of low weight and neat installation, the Roots type ranks next in these points, and the exhaust-turbo supercharger is the least desirable.



The Lancia front wheel suspension overcomes disagreeable riding qualities due to severe small-amplitude vibrations + +

Lancia Springing

by Piero Balma

AMERICAN automobile manufacturers seem to be developing an interest in the subject of independent springing and the problem involved in this method of suspension. An excellent and timely series of articles by P. M. Heldt appeared in *Automotive Industries* beginning in the September 30, 1930, issue, and it occurred to me that the readers might be interested in a discussion of the advantages and the design features of the system of independent springing employed on the Lancia chassis.

The chief advantages sought by the well-known independent springing of front wheels in the Lancia car are:

1. Vertical movement of each wheel, so that the other front wheel is not affected at all.
2. Light unsprung masses.
3. Great rigidity of the sprung front axle and resultant great stiffness of the whole frame (as will be explained).

Vertical movement of the wheels is due, as explained in Mr. Heldt's article, to the use of a hollow spindle fixed to the steering knuckle and sliding in two thimbles fixed into the upper and lower arms of the long steering yoke, respectively. The hollow spindle and its attachment to the steering knuckle are very rigid, and the distance between the two thimbles is great. With this construction, angular motion of the wheel in the vertical plane is completely eliminated, and there is no gyroscopic effect on the wheels, as occurs with the conventional front axle. Shimmy and wheel wobble are therefore impossible.

With the light unsprung masses and their little inertia, abnormal vibrations of the front wheels and disagreeable riding qualities due to severe small-amplitude vibrations disappear entirely.

In the following table are given the values of the front unsprung weights of the current Lambda and Dilambda models, compared with the car weights, laden and unladen.

WEIGHTS	LAMBDA, 167 cu. in. 6 seat limousine with two spare wheels at rear	DILAMBDA, 246 cu. in. 7 seat limousine with two spare wheels at rear
Unladen	3,660 lb.	4,650 lb.
Front (unladen)	1,610 lb.	2,100 lb.
Laden	4,600 lb.	5,750 lb.
Front laden	1,870 lb.	2,270 lb.
Whole front axle with wheels	240 lb.	365 lb.
Unsprung weight	204 lb.	290 lb.
Ratios of front sprung to unsprung weights	6.90 to 1 (unladen) 8.15 to 1 (laden)	6.25 to 1 (unladen) 7.10 to 1 (laden)

Comparing these values with the corresponding ones for conventional cars, it is found that the weight of the front axle complete with springs is slightly greater in the case of the conventional car; and, besides, it is all unsprung weight. The ratio of front sprung to front unsprung weight is therefore much greater in the conventional car.

As regards weights, it will be of interest to give the weights of the springs. These weigh only 2.25 lb. and 6.25 lb. in the Lambda and Dilambda models respectively. The calculated stresses in these springs under static load are 120,000 and 78,000 lb. per sq. in. respectively, and the maximum stresses 156,000 and 178,000 lb. per sq. in. respectively. These stresses are very high, especially in the case of the Lambda model, which is due to the limited space in the whole assembly. But by the use of high-quality steel of 255,000 lb. per sq. in. elastic limit, and great care in design and in the heat treatment, we have avoided

Said to Eliminate Shimmy and Wobble

failure and production losses, except some slight losses in the Lambda model.

From the theoretical point of view, these high stresses would be inadmissible, considering that the same steels in leaf springs are worked at only 128,000 lb. per sq. in., and, as pointed out in one of Mr. Heldt's articles, the elastic limit in torsion is only about 70 per cent the elastic limit in tension. But considering that stresses are more nearly uniform in coiled springs than in leaf springs, and that the coiled springs are fully protected against dirt, dust and water, so that the capacity of the springs is not reduced by rusting, the absence of failure in spite of the high stresses is not hard to explain. In practice, leaf springs designed to absorb the same shocks under the same conditions weigh 20 and 24 lb. respectively.

Taking the weight of the springs on the Dilambda model as a basis, it is found that in practice leaf springs weigh about 3.8 times as much as coil springs.

For proper operation, independent front springing calls for great stiffness of the front axle and frame. Provision of this stiffness results in important advantages from the riding-quality standpoint, since vibration and shake of the radiator and hood, and squeaks and rattle of the body do not occur even at high speeds on rough roads, hence their bad effects on the driver are eliminated.

The early design of the Lambda model had plenty of rigidity from the beginning, since the body frame served as the main structural member and was rigid enough in itself. Many difficulties arose with the early Dilambda frame design. It had the conventional channel side and cross members, and the reaction of the knuckle spindles on the yoke thimbles, due to road shocks, twisted them sufficiently so the knuckles could not slide and the springs did not function.

We then designed and tested a frame with deep, double-walled side members, with a stiffened flywheel housing and two large-diameter tubes (4¼ in.) as intermediate cross members, and the front axle and a strong fuel tank as front and rear cross members respectively. This frame was not sufficiently stiff, for when testing it on rough roads, the whole chassis and body vibrated violently.

Laboratory research showed that this frame could be considered as an elastic solid which when twisted would get into resonance with the up and down motion of the wheels. Increased stiffness was needed, and the two tubular cross members therefore were replaced by a double-walled X-shaped cross member extending from the flywheel housing to the front supports of the rear springs. This cross member is used in the current model. Vibration then disappeared entirely, and the car became very agreeable to drive and comfortable to ride in.

A mathematical analysis of the elastic resistance of the frame to twisting moments is very difficult, but it was found that road conditions could be duplicated in laboratory tests. The frame was anchored at the points were the front ends of the rear springs connect to it, and a twisting moment was then applied at the forward end by applying a fixed load to the end of a long cross bar.

I then measured the torsional deflections under static moments of different frames that had been tested out on the road, and finally found the deflection value of the better frames. Since under the same conditions of load and length of bar (torsional moment) the torsional vibration period is proportional to the static deflection, the value of the latter for the frame that proved best in the road tests, could be used as a basis on which to design a new frame. In fact, it suffices to make the static deflection under the same conditions constant. Any increase in weight on the front wheels or in the width of track calls for a proportional diminution in deflection, and vice versa.

This additional stiffness can be obtained without increasing the weight of the frame. The frame of the Dilambda, which is made of 5/64-in. stock, weighs 365 lb., or about one-seventh of the weight of the whole chassis (2650 lb.), which is no more than the proportional weight of the conventional frame.

On the other hand, the frame of the Dilambda is rather expensive to build. But after extensive researches and tests I reached the conclusion that the car could be built more economically and still retain the independent front springing. In fact, a new car designed by me, which is now going into production, and will be exhibited at the Paris Show, is no more expensive to produce than a similar conventional car, while on the other hand, its riding qualities are superior.

The frame side rails are of channel section, made of 7/64-in. stock. The necessary stiffness is obtained by two double-walled longitudinal members at the forward end, extending from the front axle pads to a double-walled cross member behind the gearbox. The X-shaped double-walled cross member is retained, and extends from the cross member referred to to the rear spring front brackets. The fuel tank, which is bolted to the lower flange of the frame side members, serves as a rear cross member.

All of the double frame members are made up of

(*Turn to page 236, please*)

The stiff frame and axle required for independent suspension result in important improvements in riding qualities + + + + + +

Friction is Independent of Load in

by
P. M. Heldt

An analysis on the basis of the dimensional theory has shown that the friction coefficient varies directly as the absolute viscosity and the angular speed and inversely as the load per unit of area + + + + + + + +

IT has been only in recent years that the relations between the friction in a well-lubricated bearing (in which there is what is known as complete-film lubrication) and the various factors on which it depends have been cleared up to any extent. Many people still regard journal bearings as subject to the law of solid friction, according to which the friction is directly proportional to a coefficient of friction, practically independent of the load on the bearing and of the speed at which the journal rotates in it. If this law applied, then the friction of the bearing would increase in direct proportion to the load on it, whereas all recent experimental data tend to show that under the conditions mentioned the friction is practically independent of the load.

In order to understand the relations between the load on a bearing and the frictional losses therein, it is necessary to distinguish clearly between friction and the coefficient of friction. The friction of a journal bearing is equal to the force which must be applied tangentially to the surface of the bearing in order to keep the journal in motion. The coefficient of friction, on the other hand, is the ratio of this force to the load on the bearing (the pressure which forces the surfaces of journal and bearing together). Friction therefore is equivalent to a force, while the coefficient of friction is a ratio between two forces.

When high-speed machinery first came into general use, toward the end of the past century, steps were taken in different industrial countries to determine the laws of bearing friction experimentally, and considerable data on the subject were collected. It was then found that, as above stated, the friction is practically independent of the load on the bearing and that, in consequence, the coefficient of friction is substantially inversely proportional to the load. Under these conditions the conception of a coefficient of friction is more or less irrational, for the use of such a coefficient, which represents the ratio of friction to load, implies that the friction varies in direct proportion to the load and that the coefficient of friction is not affected by the load. However, the conception of a coefficient of friction goes back so far in engineering history and has been taught in mechanical textbooks in connection with all sorts of frictional phenomena for so long that it will probably be a long time before its use in connection with phenomena of fluid friction will be entirely discontinued.

Unfortunately many of the data obtained from the earlier experimental work were faulty and calculated to convey a wrong impression as regards the relation between different factors affecting bearing friction. Some of these tests, for instance, were made on bearings with ring oilers, in which the bearing is provided with an oil well below it and with a metal ring threaded over the journal, the lower part of which dips into the oil in the well. In order to keep all factors other than those studied at any particular time constant, means were provided for keeping the temperature of the oil in the well constant, while observations were being made on the effects of changes in the load and the speed. The temperature of the lubricating oil is of importance because the viscosity of mineral oil changes very rapidly with temperature; however, it is not the viscosity of the oil in the well but that actually in the film between bearing surfaces that determines the bearing friction.

The heat generated in such a bearing varies with the speed, if all other factors are constant. Therefore, with increase in speed the temperature of the film would increase; this effect would be partly compensated for by increasing the cooling effect on the oil in the well, but the temperature difference between film and well would increase and thus conditions would be changed. This explains why, according to these early experiments it seemed that the friction coefficient (and also the friction) varied substantially as the square root of the speed, whereas the theory explained further on and more recent experimental data show that the friction varies in direct proportion to the speed.

Since about 1914 considerable work on the laws of bearing friction has been done at the Bureau of Standards at Washington by Hersey, Herschell, Buckingham, and others, and the theory of dimensions has been applied to the problem. According to this theory there are only three fundamental physical entities, viz., length, mass and time, and all other physical conceptions or quantities capable of being measured are bulit up of these fundamentals, as it were. Thus an area is a length raised to the second power; a volume, a length raised to the third power; a velocity is a length divided by a time; an acceleration, a length divided by a time raised to the second power, and so on. Since force is equal to mass multiplied by acceleration, it is equal

Well Lubricated Bearings

to a mass multiplied by a length and divided by the square of a time; and energy, which is equal to a force times a length, is equal to a mass multiplied by the square of a length and divided by the square of a time. It is customary to give the dimensional values of these different quantities as follows:

Area $= L^2$
Volume $= L^3$
Velocity $= L/T$ or $L\ T^{-1}$
Acceleration $= L\ T^{-2}$
Force $= M\ L\ T^{-2}$
Energy $= M\ L^2\ T^{-2}$

Dimensional values have been thus found for all of the mechanical units and all of the electrical, optical and thermal units with the sole exception of temperature. Several suggestions have been made for a dimensional value for temperature, but the argument in each case is not as clean-cut and unobjectionable as in the case of the other units, and the problem may be regarded as not yet satisfactorily solved.

One advantage of the dimensional theory is that it gives a check on the validity of equations intended to express natural or physical relationships. In order that such an equation may be rational, not only must the dimensional values of both sides of the equation be alike, but all terms of one side of the equation that must be added to or subtracted from another one must have the same dimensional value as that one. How this theory can be applied to a study of the factors affecting bearing friction may be seen from the following:

It was stated in the foregoing that experiments had shown that in a well-lubricated bearing the coefficient of friction is substantially inversely proportional to the load p on the bearing. This would suggest that the relation could be expressed by the equation

$$f = \frac{c}{p}$$

where f is the coefficient of friction, c a constant, and p the load on the bearing. Such an equation would be irrational, however, if c be regarded as a non-dimensional quantity, because in that case only one of the three factors, p, has a dimensional value, and there is no equivalent dimensional value in the left hand member of the equation. The coefficient of friction, a numerical ratio between two forces, can vary only as some other numerical ratio between factors affecting the operation of the bearing, such, for instance, as the ratio of length to diameter. If both the length and diameter were changed in such a way that the ratio between them remained constant, and all other factors remained the same, there should be no change in the coefficient of friction. On the other hand, if only the length were changed while the diameter of the bearing remained the same, then the length diameter ratio would be changed and so would the coefficient of friction.

The coefficient of friction also depends upon the clearance between journal and bearing, and here again the direct relation is not between the coefficient of friction and the clearance, but between the coefficient of friction and the ratio of clearance to diameter.

The three most important factors affecting the friction in any bearing with complete film lubrication are the load, the speed and the viscosity of the lubricant in the film. The coefficient of friction decreases as the load increases, and it increases with the speed and with the viscosity of the lubricant. All three of these factors have dimensional values, and since the coefficient of friction has no dimensional value it cannot vary in direct proportion to any one of them but must vary with the ratio of the product of speed and viscosity to the load.

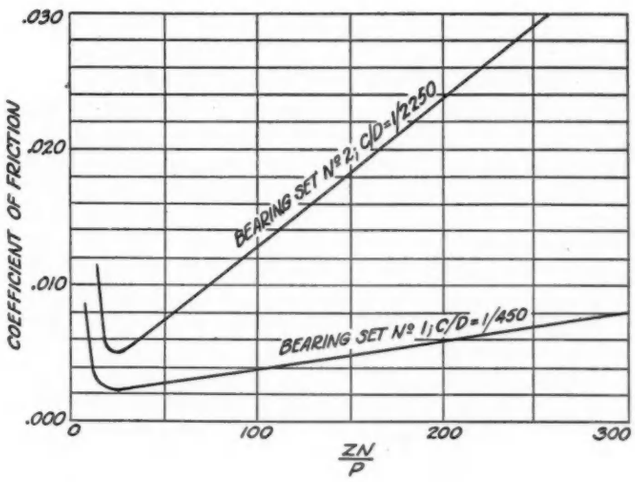
The unit of absolute viscosity is defined as the force required to move a unit area of plane surface at unit speed over another plane surface from which it is separated by a layer of lubricant of unit thickness. The force required to move a surface relative to another surface from which it is separated by an oil film varies

directly as the viscosity z,
directly as the area of the surface, or as L^2,
directly as the speed of motion, or as $L\ T^{-1}$, and
inversely as the thickness of the lubricant film, or as L^{-1}.

Since the dimensional value of force is $M\ L\ T^{-2}$, we may write $M\ L\ T^{-2}$ varies as $z \times L^2 \times L\ T^{-1} \times L^{-1}$ or as $z\ L^2\ T^{-1}$ from which it follows that

z varies as $M\ L^{-1}\ T^{-1}$

In other words, the dimensional value of absolute viscosity is $M\ L^{-1}\ T^{-1}$.



This chart shows that in a well-lubricated bearing the friction coefficient varies directly as the rubbing speed and the oil viscosity and inversely as the bearing load per unit of surface + + + + + + + +

Whereas linear speed or velocity has the dimensional value $L\ T^{-1}$, the speed of shafts is generally given in terms of angular speed, as so many revolutions per minute. Now "revolutions" is a numerical ratio between two lengths (for instance, the distance traveled by a point in the bearing surface of the shaft during the number of revolutions in question to the distance traveled by that same point during a single revolution). Hence, whereas the dimensional value of linear speed is $L\ T^{-1}$, that of angular speed is T^{-1}.

The pressure with which the surfaces are pressed together has the dimensional value of a force, viz., $M\ L\ T^{-2}$, so that the specific load or pressure per square inch has the dimensional value

$$M\ L\ T^{-2}/L^2 = M\ L^{-1}\ T^{-2}$$

Thus the product $z\ n$ has the dimensional value

$$M\ L^{-1}\ T^{-1} \times T^{-1} = M\ L^{-1}\ T^{-2},$$

which is exactly the same as that of the specific load p, and the expression $z\ n\ /\ p$ is a numerical ratio without dimensional value.

Therefore, the coefficient of friction should vary in direct proportion to the value of the expression $z\ n\ /\ p$, where

z is the absolute viscosity of the lubricant

n, the angular speed of the shaft (revolutions per minute), and

p, the specific load on the bearing (lb. p. sq. in.).

Recent experimental data fully bears out this conclusion, and the chart reproduced herewith shows not only that the friction coefficient of a bearing with complete-film lubrication is directly proportional to the expression $z\ n\ /\ p$ but also that it is proportional to the ratio of clearance to diameter.

Lancia Springing Said to Eliminate Shimmy and Wheel Wobble

(*Continued from page 233*)

two channel sections that are oxy-acetylene welded together, and they are secured to the side rails by means of rivets and electric welding.

The front axle consists of a carbon-steel tube of 2 61/64 in. outside diameter and 5/32 in. wall thickness. Steering heads are forged and machined before they are electrically welded to the tubular axle. Two pads are also electrically welded to the front axle tube, in the same way as in the case of conventional tubular front axle, by means of which the whole front axle is bolted to the forward end of the frame side rails.

Another interesting problem that arises in connection with the Lancia with independent front springing is the steering layout. The distance between the swivel-pin axis and the center point of ground contact of the tire is comparatively large—4⅛ in. and 4 9/16 in. in the Lambda and Dilambda respectively. A special design of steering mechanism therefore was necessary, to reduce the stresses on the steering gear parts as much as possible.

The tie rod is placed in front of the axle and is subjected only to tensile stresses. The steering arm, moreover, is made longer than usual, so that the load on the drag link is no greater than in the average car. The steering gear is of the worm-and-sector type; the worm sector is made with a comparatively large pitch radius, in order to reduce the tooth pressure, and it is mounted on ball bearings to reduce the friction.

The steering gear is completely reversible; owing to the absence of violent front-end vibration, no shocks are transmitted to the steering wheel and to the driver's hands. Two and one-half complete turns of the steering wheel are required to move the front wheels from hard over one way to hard over the other way, and the maximum deflection of the front wheels is 47 deg. In this way we obtain easy and positive steering at all speeds and on all roads.

You will be interested to know that we also tried slightly inclining the axes of the guides in which the knuckles slide, as in conventional design. It was found that this led to the well-known disadvantage of inclined pivots, that the car is somewhat harder to steer at low speeds, which is due to the fact that when the wheels are deflected the whole front end of the car is raised. The same defect was observed when giving the pivot pin a caster angle, and at low speed the springing did not work as well as with vertical guides. Since any change in load acts in the vertical direction, the relative motion produced thereby also should be vertical, especially at low speeds, when the change in the load and the consequent rise of the wheel occur smoothly and are not sufficient to overcome the extra resistance due to inclined spindle guides. Under static load the spindle guides can be vertical from every point of view. Only little wheel camber (1½ deg.) is possible, and in order to produce a castering effect of the wheels, so they will tend to return to the "straight-ahead" position, the wheel spindle is offset ⅜ in. from the knuckle pivot.

Independent rear springing does not add to the advantages of independent front springing. I designed and tested an independent rear suspension of the same type as the front suspension, using two universal joints in the drive to each wheel, but the riding qualities were not improved, and the rather expensive rear-axle construction was abandoned.

I have also obtained good results with independent front springing in a little four-wheel-drive military truck, and this confirms Mr. Heldt's statement regarding the adaptability of independent springing to cars with front-wheel drives.

From my experience with independent springing I can say that it is impossible to obtain the same result with any type of conventional car as with the Lancia front springing, especially at high speeds on uneven roads. Mr. Heldt's statement that the design of such a system involves more of the elements of the experimental than does a conventional front axle is correct. In fact, the only cars with independent springing which have been in regular production for several years are the Lancia models.

The airport at Berlin is well equipped for day or night service

Luft Hansa Penetrating Manchuria With Air Mail-Passenger Service

German concern shows increase of 11 per cent in number of passengers and 40 per cent in amount of mail carried. A decrease in freight held due to the expiration of a contract with the Soviet

IN his annual report for the business year 1930-31, Martin Wronsky, member of the board of the German Luft Hansa (Air Union), refers to operations of the Hansa outside of German territory, and discloses some rather interesting views and plans regarding the future development of long distance air lines.

The traffic on the Berlin-Moscow and Berlin-Leningrad lines of the Deruluft company (German-Russian Air Co.) developed satisfactorily, the number of passengers having increased 11 per cent and the mail carried 40 per cent. On the other hand, there was a decrease of 30 per cent in the amount of freight carried, which was due to the fact that large quantities of German freight destined for Russia are no longer handled by the Berlin commercial office of the Soviet (which favored air transport), but by the manufacturers themselves. The contract with the Russian Government concerning Deruluft operations expired toward the end of the year, but negotiations regarding its renewal have been under way for several months, and promise success.

Owing to lack of financial support from the government and for other reasons the Luft Hansa will refrain for the present from taking part in the bridging of the Siberian sector of the Russian Far-East air project. Since the Russian air monopoly (W.O.G.W.F.) already conducts an air service over the route Moscow-Irkutsk, and contemplates starting a service from Irkutsk to the Manchurian border within a measurable time, it is planned to make this a stage of the service to the Far East. The Russians, in connection with negotiations for the renewal of the Deruluft contract, asked that assurance be given that a semi-weekly transport of mails from Moscow to Manchuria and vice versa be established. For the present the mails are being carried by the Trans-Siberia Express.

During the last few months of the business year covered by the report, the German-Chinese Air Transport Co. (Eurasia) was established. The Luft Hansa contributed one-third of the capital and assistance. The capital supplied was chiefly in the form of airplanes.

After a few trial flights the company started a regular mail service between Shanghai and Manchuria. This service will attain its full importance only when the whole journey to Europe can be made by air. For the present, as mentioned above, the trip has to

(*Turn to page 249, please*)

JUST AMONG

A Week in Quiet Lakeshore Retrospect

THE thermometer stands around ninety-five. In the cities people are sweltering and sweating. Even out here beside the lake one can get the sensation of being slowly cooked if he ventures out into the sun.

But we sit, as we write, on a little knoll, cozily encircled by leaf-filled trees, a blue expanse of Lake Michigan undulates before us, the mist-hidden horizon conjures up all sorts of delightful imaginations of what *might* lie beyond.

A lake-borne breeze restlessly stirs the paper on which we write, a cool green 1931 model Remington portable comfortably, though precariously, balanced between our knees and a chair, in order that we may more easily rest our lazy body on the soft cushions of a rocking davenport.

One of the most charming of all ladies has just presented us with a cold block of chocolate-covered ice cream.

And Just Among Ourselves *must* be written this afternoon!

Times Call for Many Specific Decisions

SITTING here it is easy to think that there is no used car problems, that all automotive manufacturers are contented with their profits, that the business depression is just a myth and that that fat fellow in the red bathing suit 'way down there on the beach may actually be Santa Claus after all.

Just having spent the past week snooping around various automotive haunts in the Middle West, however, actualities have engraved themselves too deeply upon our consciousness to be utterly banished, even though thrown into softer perspective by the thoroughly shock-absorbing conditions immediately surrounding us at the moment.

Of the many things specific and general which we ran into during our travels, one general impression stands out as we look back over the week. Continued slow business, it seems, has been bringing sharper and sharper cleavage in the thinking of the conservatives and the "go-aheaders" within individual automotive organizations and in the probable policies of different companies.

Definite Actions Are The Order Today

IN good times that cleavage exists, but usually remains far beneath the surface. Action in a given company is commonly determined by compromise or by slight modification of the ideas held by the boss personally. After some argument, either side is likely to give in and forget the battle, because a compromise leaves everybody with some glory and some alibi and in good times usually produces at least fairly good results.

But now things are different. Not a few, but many automotive organizations are faced with the definite necessity for definite action in sales, design, production, finance or some other company policy. Safe compromises have been tried; they have not exactly failed, but they clearly have not produced results—not enough results to furnish a profit.

Now both groups—and both groups are represented in nearly every automotive concern—see a turning of the road ahead. They agree on just one thing—specific decision must be made to take a chance or not to take a chance.

Go-aheaders and Conservatives Clash

"IN times like these," the conservative group in a company will say, "we can't afford to take a chance. We've got to cling to our old policies, our old standards, until the weather clears, at least. By so doing we have *something* to tie to. We're sure of certain business and certain customers."

"But," reply the go-aheaders," "the records prove that we can't stand still without gradually losing ground. We must look a few years ahead. The one thing we can be sure of is that if we sit tight trying to hold on to what we've got, we won't have anything left eventually. *We can't afford not to take a chance.*"

And because everybody nearly is conscious of the fact that *laissez-faire* will be disastrous, even to companies doing relatively well at present, these opposing opinions are actually kindling

OURSELVES

sparks in many organizations today, whereas in more prosperous times each group would be content with trying to leaven the loaf.

Even Minor Executives Are Pressed for Ideas

CERTAINLY these seem like generalities to be writing immediately following a field trip. But these same generalities form the most vivid impression which we brought back.

Franker and more clean-cut divisions of opinion on what ought to be done in the immediate future exist today within the industry and within individual organizations in the industry than ever before—and those divisions of opinion are being more frankly expressed by one executive to another.

Pussyfooting still remains, but it is less prevalent. Minor executives who once were afraid to speak out, now are afraid as much for the future of the companies as for the boss's opinion—and this new fear promotes plain speaking of honest opinions.

Radicalism Sharpening Dull Edge of Initiative

THE results are certain to be good for the industry. Conservatism has been so definitely in the ascendancy for 24 months that there is little danger of wild programs being approved, even though they are suggested.

Yet the vigor with which radical programs are being urged in many instances should sharpen the dulled edge of initiative to promote the cutting of more ice in the next 12 months than in the last twelve.

Progress Seen In Engineering Flank

IN an engineering way, the "go-aheaders" in many companies seem definitely to be in the process of winning some battles as regards 1932 products.

Enough really new design ideas have already been decided on for incorporation in coming passenger car models, we believe, to indicate that 1932 will be no exception in providing hurry-up night work for engineers in those organizations which at the beginning of the year were too conservative in their thinking and action.

This year has turned out to be most profitable for those companies in both the parts and vehicle fields who were able to combine *obviously* fresh designs with engineering soundness. There is every indication that a similar condition will exist in 1932.

Stand-patters don't look like winners for the 1932 race, regardless of which phase of automotive manufacturing they may be engaged in.

Sad Earning Tales Still to Be Told

NO matter how the automobile business turns out in the last quarter of 1931, it is already evident that stock market prices are going to have to absorb a lot more bad news regarding the industry along about September when earnings statements for the third quarter make their appearances.

A few reasonably good showings will be made, but profits for a number of companies almost certainly will run behind those of a none too good first quarter.

It's well for the industry to recognize this fact early, because by the time the statements get out the relatively poor quarter which created them will have been passed into history and the industry may already be making its way to definitely better ground.

Have You a Dog to Match Your Car?

"WHICH kind of dog makes the best 'motor pal'?" is the title of an article in a recent issue of the *Austin Magazine*. It is written by a famous dog breeder and judge, and discusses the merits and demerits of various kinds of dogs from the standpoint of their desirability as constant motoring companions.

Just another evidence of the difference in attitude toward motoring there and here. It's hard to imagine just such an article finding a place in an American publication for car owners.—N.G.S.

Difficulties of Heat Treating Tubular of Normalizing and Hardening Furnace

ONE of the most interesting of recent developments in the automotive field is the reverse Elliot type tubular front axle. Before this axle could be made on a production basis it became necessary to design and develop new and special apparatus, chief of which was that used in heat treating. Control of furnace atmosphere during heat-treating operations had to be close enough to permit the attainment of proper physical characteristics to withstand the tremendous intermittent shocks and strains to which the front axle is subjected.

The Logan Gear Co., Toledo, Ohio, has succeeded in overcoming the inherent difficulties of tubular axle design and is making axles of this type on a production basis. It will be interesting to trace the production of these.

Straight S.A.E. 1040 H.K. seamless steel tubing is used for manufacture.

The tube lengths are taken to bending machines where the double bend for necessary drop is put in. All bends are made cold. The tubes are then clamped in a specially designed sawing machine where the ends are cut at the desired camber angle.

From the saw the tubes are formed and cut automatically in preparation for the reception of the king pin bearing.

The king pin bearings are machined from bar stock of lower carbon content than the tube. This separate unit is pressed into place and welded in the tube ends before going to the heat treat.

Axles now are placed on the conveyor of the combination normalizing and hardening furnace (Fig. 1). This furnace was specially designed for the work by the Surface Combustion Corp., Toledo, Ohio, in conjunction with Logan Gear Co. engineers.

It is of the continuous-chain-conveyor type, gas-fired, with a capacity of 50 axles per hour from cold to normalizing temperature of 1650 deg. Fahr. and a hardening temperature of 1470 deg. Fahr. The capacity of the furnace is limited by quenching capacity, rather than by limitations of the furnace itself. The length

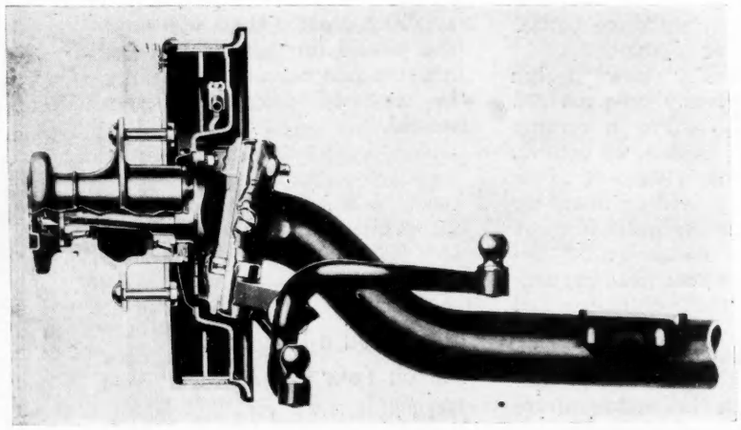


Fig. 1 (Above)—Photograph shows Logan gear tubular axle and assembly

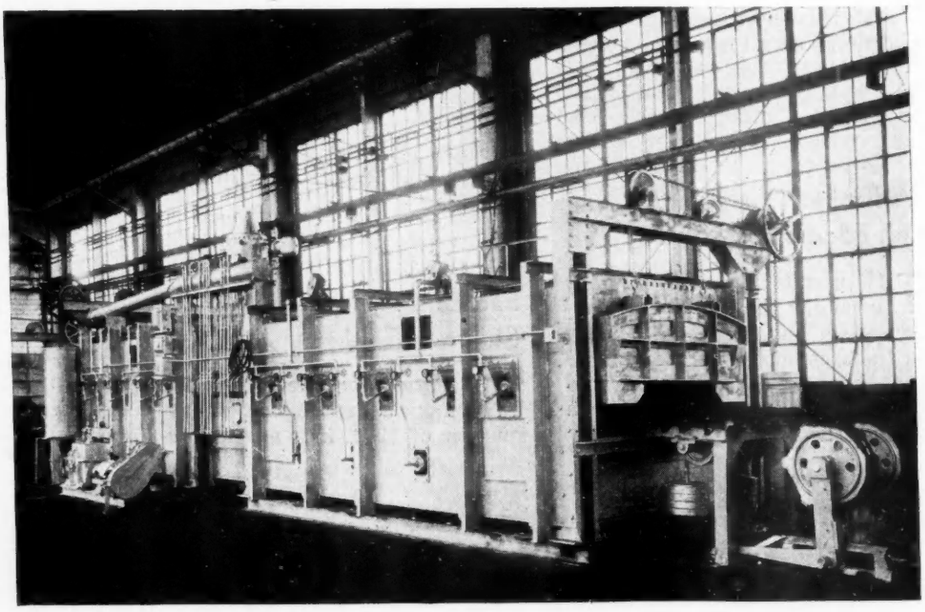


Fig 2 (Right) — Charge end of combination normalizing and hardening furnace, where axles are placed manually on conveyor + + + + +

Axles Are Overcome by Special Design

by I. W. Spring*

of the normalizing furnace inside from wall to wall is approximately 13 ft. The hardening unit is approximately 9 ft. in length. The cooling chamber between units is 6 ft. long. The entire combination normalizing and hardening machine occupies a floor space of 33 ft. long by 9 ft. wide.

The furnace is fired with high-pressure, automatic-proportioning, two-stage velocity burners, firing above and below the hearth for the entire length of the furnace. City gas of 570 B.t.u. content at 10 lb. pressure is utilized as fuel. Automatic recording controls and self-proportioning inspirators are responsible for the fine metallurgical attainment required for maintaining the high physical characteristics necessary in the product.

The tubular axles first pass through the normalizing zone on alloy steel chains, spaced on 30-in. centers, that ride in turn on alloy channels. The tubes are raised to normalizing temperature of 1650 deg. Fahr. and held at this temperature for a period of time to insure thorough normalization. They then pass into the water-cooled chamber where the temperature of the work drops just below the lower critical range point.

From here the work progresses to the reheating zone where it is brought to the proper temperature for quenching.

The furnace material handling mechanism is timed and synchronized to the capacity of the patented quenching machine, located at the discharge end of the combination normalizing and hardening furnace.

The conveyor is so timed that when the quenching operator removes an axle from the conveyor, another axle is automatically brought from the furnace.

When the axle comes up from the furnace the mechanism stops until another removal is made.

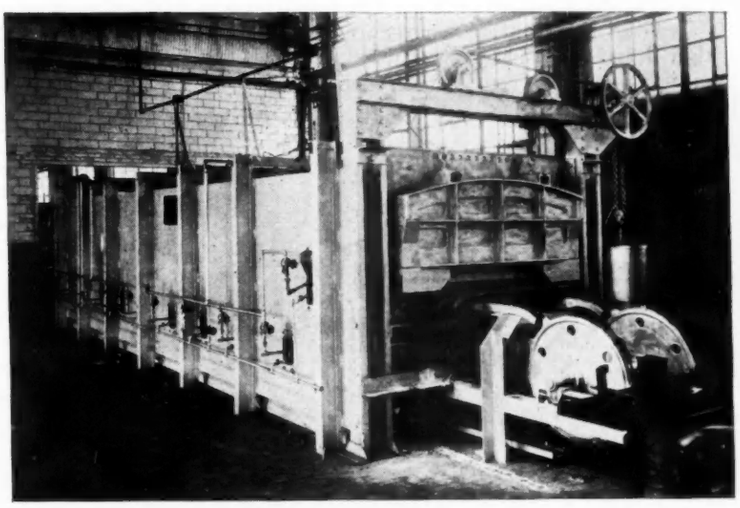
Axles are quenched in an especially designed machine that grips the axle while hot, then flooded with tempered water (see Fig. 3).

After quenching, the axles are pickled to remove all scale.

Following pickle the axles are ready for drawing. The drawing furnace, shown in Fig. 4, designed and built by the Surface Combustion Corp., is located opposite the discharge end of the hardening furnace, adjacent to the quench, for convenience in progressive production. It has a capacity of 75 tubular axles per hour weighing approximately 17 lb. each, heated from cold to 800 deg. Fahr., and consists of reheating and soaking zones. The overall length of furnace chamber is 22 ft. 6 in. with wall to wall width of 71 in. and

(*Turn to page 244, please*)

* Chief Engineer, Logan Gear Co., Toledo, Ohio



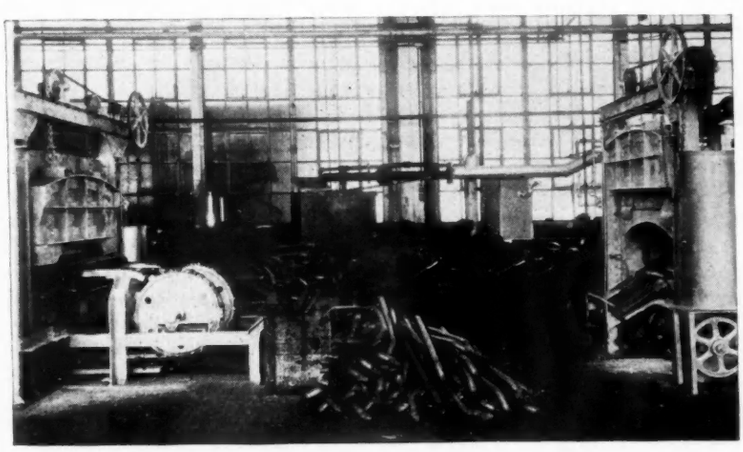


Fig 4 (Above)—Charge end of the SC drawing furnace, showing axles on conveyor + + + + +

Fig. 3 (Left)—Discharge end of combination normalizing and hardening furnace and charge end of drawing furnace, including special automatic quenching machine

Hispano-Suiza 1000 hp. 18 Cylinder Is Designed After 1929 Schneider

FOR the 1929 Schneider Cup race for seaplanes the Hispano-Suiza firm of France built an eighteen-cylinder engine with a rating of 1650 hp. of which no details had been published until quite recently. This is one of the largest aircraft engines ever built and one of exceedingly low specific weight. The Hispano firm has now decided to market an engine of this type and of the same general design throughout, except for certain details which, while suitable for a racing engine, could be improved upon where application to military and commercial planes is contemplated.

The new stock engine, however, is rated at 1000 hp. and its normal operating speed is 2000 r.p.m. instead of 2400 r.p.m. The engine has a bore of 150 and a stroke of 170 mm. (5.91 by 6.70 in.), and its maximum brake horsepower is said to be 1125 at 2000 r.p.m. The weight of the engine dry, but with propeller hub, is given as 1188 lb., which makes the specific weight on the basis of the equivalent horsepower 1.05 lb. The following information concerning design details of this new giant aircraft engine is taken from our French contemporary, *L'Aeronautique*, to which we are also indebted for the illustrations.

The crankcase consists of four Elektron (magnesium alloy) castings, viz., the upper part or crankcase proper, the lower part, and the two ends or covers. Of the latter the rear cover has the magnetos and the water pump mounted upon it. Owing to the use of angles of 80 deg. between cylinder banks, the main crankcase casting is of nearly cylindrical shape, which assures great rigidity for the amount of metal employed. The engine is supported on the fuselage by means of flats formed on the under size of the two lateral cylinder banks. In the upper part of the crankcase there are seven box girder type bulkheads which carry the main bearings for the crankshaft.

In accordance with a practice employed in earlier Hispano engines, provision is made for the circulation

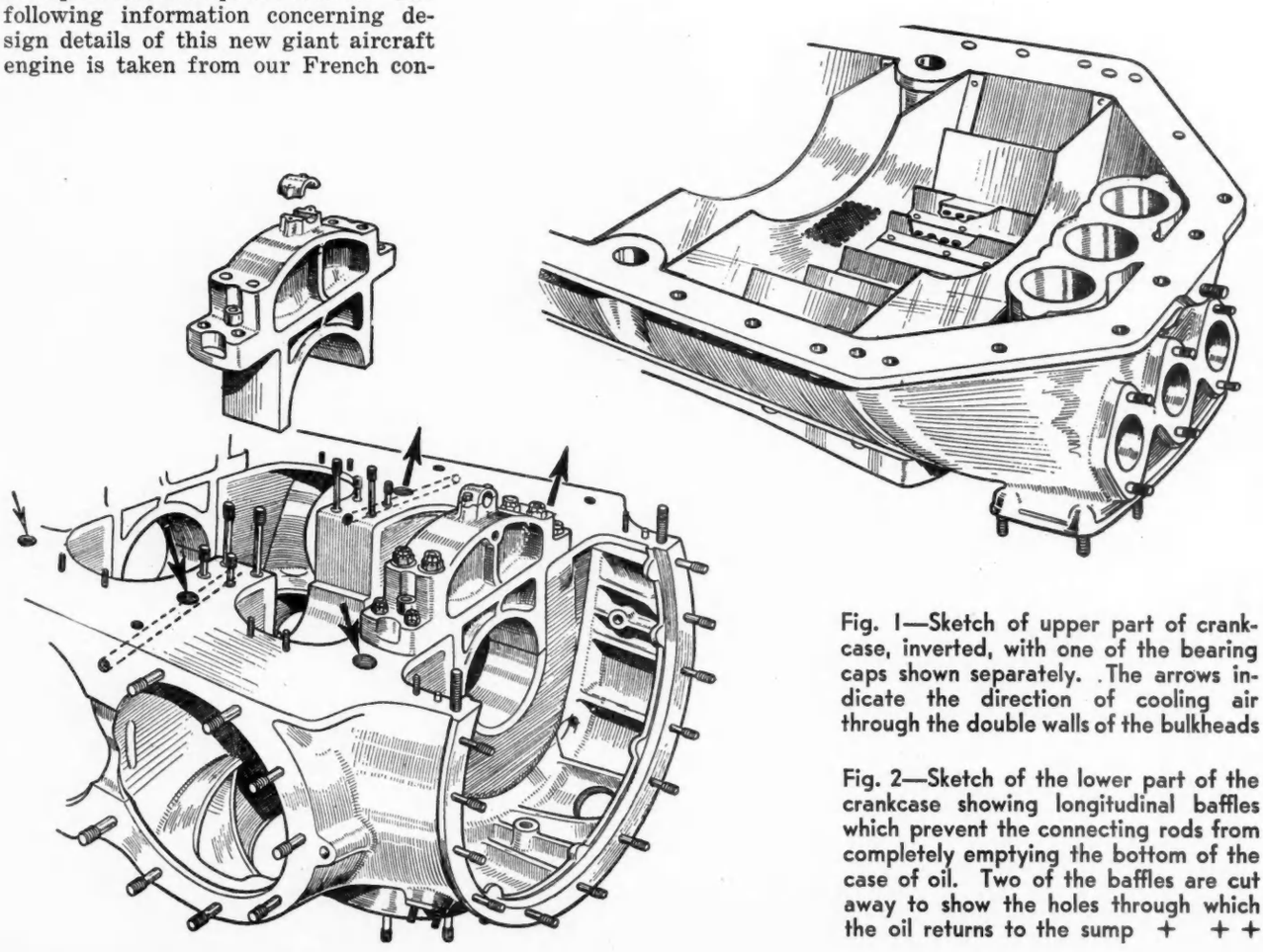


Fig. 1—Sketch of upper part of crankcase, inverted, with one of the bearing caps shown separately. The arrows indicate the direction of cooling air through the double walls of the bulkheads

Fig. 2—Sketch of the lower part of the crankcase showing longitudinal baffles which prevent the connecting rods from completely emptying the bottom of the case of oil. Two of the baffles are cut away to show the holes through which the oil returns to the sump + + +

Stock Aircraft Engine Cup Race Entry

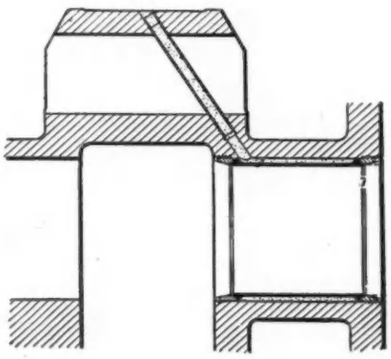


Fig. 3—Arrangement of tubular insert in bore of crankshaft main journal to reduce the weight and the amount of oil in circulation + + + + +

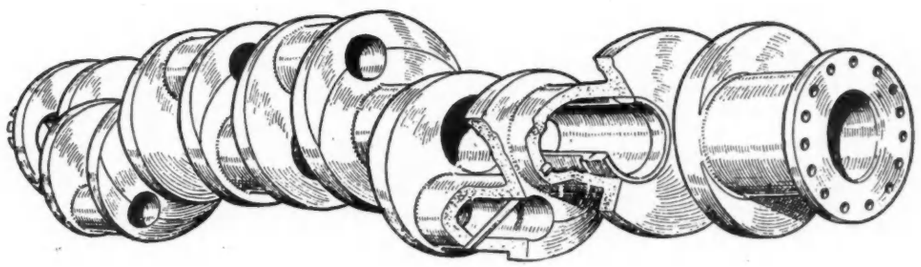


Fig. 4—Sketch of the six-throw crankshaft. The crank cheeks are disk-shaped but beveled off at the ends of the crankpins + + +

of air through these box girders to help cool the bearings. This ventilation permits of higher unit bearing pressures; in other words, of reducing the length of bearings and, therefore, the overall length of the engine. It has been found that at normal load the bearings run about 24 deg. Fahr. cooler with ventilation than without.

The lower part of the crankcase is a mere cover and its bottom slopes down from the center toward both ends, so that the oil will collect in basins formed at the ends. At the rear this part of the crankcase carries the oil pumps, which are of the vane type, one pressure pump and two scavenging pumps being provided. The fuel pumps are located underneath the oil pumps.

The forward part of the crankcase is adapted to be fitted with a Farman reducing gear, and to this end is heavily ribbed internally.

The crankshaft is supported in six plain bearings and one roller bearing (at the rear). Three of the plain bearings receive oil under pressure directly. The bearings are of the steel-back, babbitt-lined type, the steel shell made in halves, having a thickness of about 0.080 in. and the babbitt lining of about 0.016 in. The babbitt is cast directly into the steel shells as turned in the lathe, without holes through the shells for anchoring it, thus eliminating the weakening effect of such holes.

The bearings are held in place by rather massive bearing caps which are secured to the upper crankcase by eight studs each, four long and four short ones, and by two inclined screws which take care of any transverse components and reduce the stresses in the bulkhead at the moment of explosion. These bearing caps are dovetailed into the bearing halves on the crankcase. At their bottom they are provided with a seat for the oil header, which latter is held in place by a cap and two cap screws.

In the engines so far built the crankshaft (which has all of its journals bored out to large diameters) is always filled with oil. In the latest design in order to lighten the engine and reduce the amount of oil in

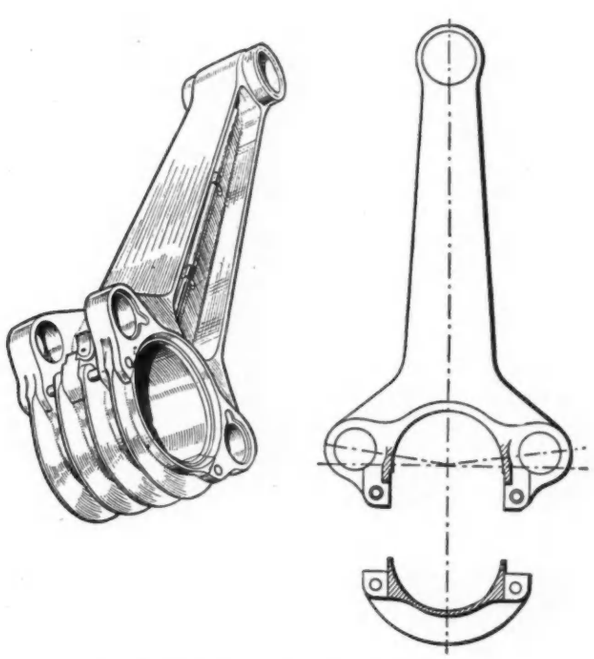


Fig. 5—Two views of the master connecting rod, which has the cap fastened to it with a sort of hinge-joint employing a tapered pin + + + + + + + + + +

circulation, the oil space on the inside of the main bearings has been reduced by investing a steel tube of an outside diameter ¼ in. less than the bore. This tube has 60 deg. conical surfaces at its ends and is held in place by two ring nuts screwing into the bearing from opposite ends, with tapered-out surfaces which press against the conical surfaces of the tubes. In this way annular oil chambers with a depth of ⅛ in. are formed on the inside of the main journals, from which oil is conducted to the crankpins through small tubes of light metal in the usual way.

The connecting rods are of two types, master rods and plain rods, two of the latter being articulated to one of the former. The master rod head is split, but both sets of eyes for the articulated rods are on the rod proper. A tube runs up the side of the master rod for the lubrication of the piston pin. The caps of the master rod are very light but are provided with four ribs of unusual depth (0.59 in.). The joint between rod and cap is of unusual design, something like a hinge joint. This assures that the metal of the conical pin works in shear only. There is said to be less deformation of the head than in the case of a cap held on by bolts in which the bolts are subjected to tension even when the engine is not running. There is no danger of the head being deformed by drawing up on the bolts, and the alignment of the cap with the rod is said to be perfect. Advantages are claimed for this method of securing the connecting rod cap from the triple standpoint of lightness, accuracy and rigidity. Connecting-rod head bushings are steel-backed and babbitt-lined, and they are easily renewable.

The articulated rods are of tubular section and provided with bronze bushings at both ends, these bushings being inserted in a press. The pins of the articulated rods are supported at their middle by a boss on the master rod, to reduce the bending stress to which they are subjected.

In the racing engine a compression ratio of 10 was employed, the reduction of the compression space being achieved by giving the pistons a special form. In the stock engine the compression ratio is reduced to 6.2 and conventional pistons are used.

The cylinder blocks are of the same design as those of the 12-cylinder Hispano Model N. No fewer than nine carburetors are fitted, each supplying two cylinders. This is in accordance with a well-established practice of the company. In a Schneider Cup racer there is no need for an altitude adjustment, and the control linkage therefore is relatively simple. For the purpose of reducing the weight the A.M. fuel pumps are of a special type with body cast of magnesium alloy.

So far these engines have been built for atmospheric induction only, but a supercharged model is said to be under development at present.

Bus Steam Heating System Has Throttle Control

A NEW steam heating system for motor buses has been developed by Bordeaux Laboratories, Inc., Albany, N. Y. The heat used is taken from the exhaust pipe between the manifold and the muffler. The steam generator is made of ¾-in. alloy tubing which is wound into a coil over a 3-in. mandrel. There are two of these generators, each consisting of 16 ft. of tubing, and together they have a heating surface of 215 sq. in., which is said to be ample for buses of from 16 to 40 passengers capacity. The steam produced in these generators is delivered to two radiators inside the bus, made of 1¼-in. seamless copper tubing provided with fins. At the far end of each radiator there is an air tank designed to take up any air that may get into the system, thus making the whole length of the radiator tubing available for heating purposes. A feed pump for the generator is connected to a line of 1½-in. tubing joined to the exhaust immediately behind the generator, by means of a Y. At this point the line is equipped with a butterfly valve which can be controlled from the instrument board. Thus the operator is enabled to control accurately the proportion of the exhaust gases diverted from the main line into the pump.

The pump consists of an upper bronze casting forming a reservoir of about one quart capacity, which usually holds about 16 oz. of water, and a lower aluminum casting through which the exhaust gas is by-passed. Projecting into the lower part and separating it from the upper one is a finned well casting. This well has a capacity of ⅛ oz. and is connected to the reservoir by a hydrostatic valve and to the steam generator through a length of ¼-in. copper tubing wrapped with asbestos.

In operation, the exhaust gases cause the water in the well to expand and to percolate over into the generator. The instant the well is relieved the water in the reservoir opens the hydrostatic valve and more water flows in. This in turn is spurted over to the generator. There the water is almost instantly converted into steam and then superheated before it passes on to the radiators.

Heat control is entirely by the throttle valve which governs the proportion of the exhaust gases passing through the pump and thus the rate at which water enters the generator.

Heat Treating Tubular Axles

(Continued from page 241)

hearth width of 56 in. It occupies a floor space of 44 ft. long by 8 ft. 6 in. wide.

The material-handling mechanism consists of malleable iron chains supported by cast iron rails, with driving power at the discharge end and sprocket equipment at the inlet end. Variable speed control fixes the charging rate on 18-minute heating cycles.

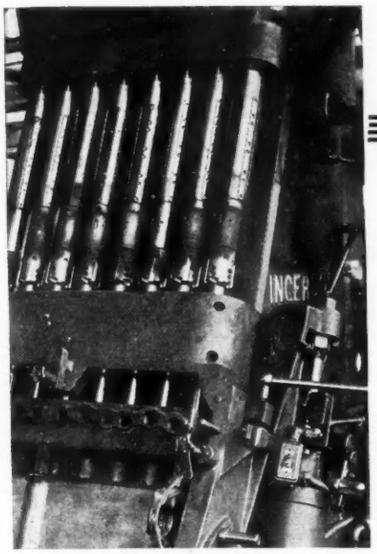
The furnace is fired with 570 B.t.u. city gas by means of 18 high-pressure two-stage velocity burners.

At a production rate of 75 axles (1200 lb. net work) per hour gas consumption of the draw furnace is approximately 669 cu. ft. of gas per hour, although burner capacity is 1287 cu. ft. per hour. Automatic heat controls and recording closely regulate heat in both heating and soaking zones.

During the drawing process temperatures are held closely to obtain the desired hardness.

Atmosphere control during heat treating is of such a character that scale is almost entirely absent. Rockwell hardness tests indicate that the heat treating is uniform throughout. Rejections are few.

PRODUCTION LINES



Can't Get Away From It

What are the prospects for new equipment this year? Unusual optimism is found in confidential reports to the writer from factory executives. More machinery purchases are in the offing than we would have estimated or guessed. A group of large manufacturers have already placed their orders. But this is not the only encouraging sign. Take the case of a company which is retrenching to the limit. Here is what our correspondent writes: "We have adopted a policy of switching machines from one operation to another, and in some cases are using machines which two years ago would not have been considered. But my personal opinion is that the machine tool manufacturers as well as makers of new cutting materials will force all of us in the next eight months to a year to replace our obsolete equipment." — Progress hinges on utilization of modern production equipment.

Eloquent Evidence

These columns have noted on several occasions the increasing productivity of manufacturing equipment. Which is one of the main things to consider when selecting or replacing yours. So we are glad to pass on the following figures from the July, 1931, issue of the *Heald Herald,* a publication of the Heald Machine Co.:

No complete general data are available on the increased productivity of machine tools, although the following index of 14 important types of the tools most widely used in modern production plants is significant and gives perspective (1902 represents 100):

Year	Index of Productivity
1904	110
1910	155
1916	210
1922	260
1926	460
1930	700

A typical illustration of this progress is the production per hour per machine on one operation on the same automobile part:

Year	Production Per Hour
1910	40
1915	60
1920	90
1928	125
1929	140
1930	248

Describes Tool Developments

Much new material on splines will be found in Catalog "H," now ready for the mails. By the Barber-Colman Co., Rockford, Ill. Tells about the newly developed elongated tooth hob and its applications in splining. Another section deals with their line of reamers, with emphasis on reaming to close limits.

Keeping Tabs

A practical method of keeping an accurate check on commercial diamonds is given in *Tool Tips,* Ex-Cell-O monthly publication for July, 1931.

"Each diamond is assigned an individual number, which is stamped on the shank of the holder. An ordinary ledger, with pages numbered to correspond with the numbers stamped on the shanks, will serve as a register.

When the diamonds are issued from the tool crib, whether they go out on charges or checks, the crib attendant enters the workman's name, clock number and date when issued, on the corresponding numbered ledger page. By this method, all diamonds can be quickly traced, should the occasion arise. This record also serves as a perpetual inventory, as the weight of the diamond was stamped on the shank when originally placed in stock and upon resetting the diamond. The new weight can either be stamped upon the shank or entered on the proper ledger page. The difference between the two weights represents the diamond depreciation.

CO + O = Safety

When Cadillacs roll off the line under power, exhaust gas odors and danger due to carbon monoxide are effectively tamed by ozone. Ozone is that peculiar odor present during lightning discharges. It is produced mechanically by the Ozonator, which generates static electricity continuously. This device takes atmospheric oxygen, squeezes three atoms into one, and discharges the stream by means of a small blower. Ozone then converts poisonous carbon monoxide into odorless, harmless carbon dioxide, thus improving working conditions and conserving health.

Create Foreman-Managers

Foremen can do a lot to cut costs, promote elimination of waste, reduce labor turnover. Keep them posted on the latest ideas along these lines. Stimulate their thinking with well-chosen, pertinent reading matter. One of the finest messages to foremen we have seen is the *Foremen's Bulletin,* published weekly by the American Rolling Mill Co., Middletown, Ohio. Brief, informative, easy to read. Hugh W. Wright, supervisor personnel publications for the company, has volunteered to place a limited number of readers of *Automotive Industries* on the mailing list. Here is a signal opportunity to help your foreman. Send your request directly to Mr. Wright. Get a copy for each foreman.—J.G.

Simplicity of Vacuum Clutch Opens

Smooth engagement of the gears is assured with vacuum-operated clutches

IN the case of heavy, high-speed vehicles, such as buses and high-speed trucks, it has become customary to provide means for applying the brakes by mechanical power, the chief reason being that the average driver is unable to exert sufficient pressure on the brake pedal to apply the brakes to the locking point. Next to the brakes the two items of the control mechanism that require the greatest amount of physical effort are the steering gear and the clutch, and there appears to be a movement at present to apply power operation to these also. In certain buses in which the doors are being operated by air motors and the brakes are applied by compressed air, the clutch is disengaged by an air cylinder.

Clutch operation can be effected also by the vacuum in the inlet manifold, and this system has been given particular attention during the past year, at least two different systems of clutch control by inlet-manifold vacuum having been developed to the production stage.

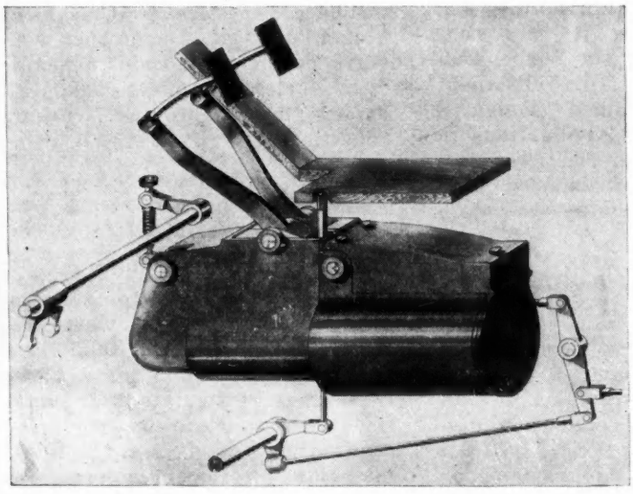


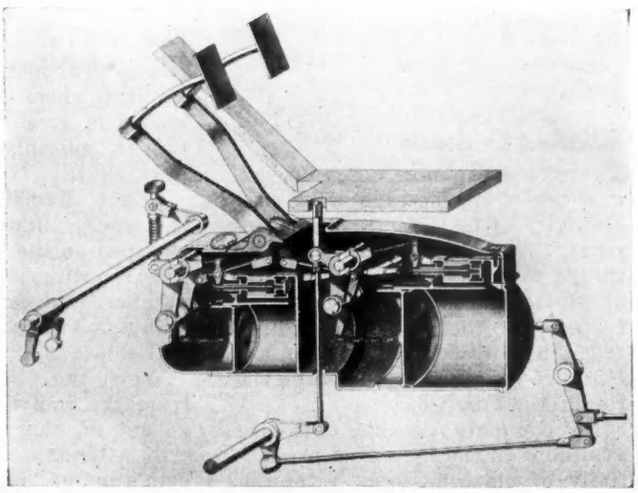
Fig. 1 (above)—Dewandre brake servo and clutch servo unit + + + + +

Fig. 2 (right)—Section through Dewandre unit

The advantage of the vacuum system of control is its simplicity. As long as the engine is running this source of power is available, and it is, of course, only while the engine is running that the clutch needs to be disengaged. Disengagement of the clutch is always accompanied (or preceded) by release of the accelerator pedal, so as to keep down the speed of the engine when the load is removed from it. As soon as the accelerator pedal is released and the throttle valve thus allowed to close to the idling position, there is plenty of vacuum available in the inlet manifold.

A clutch-operating mechanism actuated by vacuum can be worked out in a number of different ways. In the first place, either a cylinder or a diaphragm chamber can be used as the operating member. Whichever device is used, it must be provided with a valve or a system of valves by which it can be placed in communication alternately with the inlet manifold and the atmosphere. The piston or diaphragm plate is connected to the clutch pedal by means of a slotted link or cable, so that the clutch can be disengaged by pedal pressure if desired without regard to the vacuum mechanism.

One requisite for successful clutch action is, of course, that the clutch must not be engaged too rapidly, as that would result in severe shock to both the engine and the transmission mechanism, and give an unpleasant jolt to the passengers. This can be prevented by suitably throttling the air flow into the cylinder or diaphragm chamber after its communication with the inlet manifold has been cut off, thus making the engagement independent of



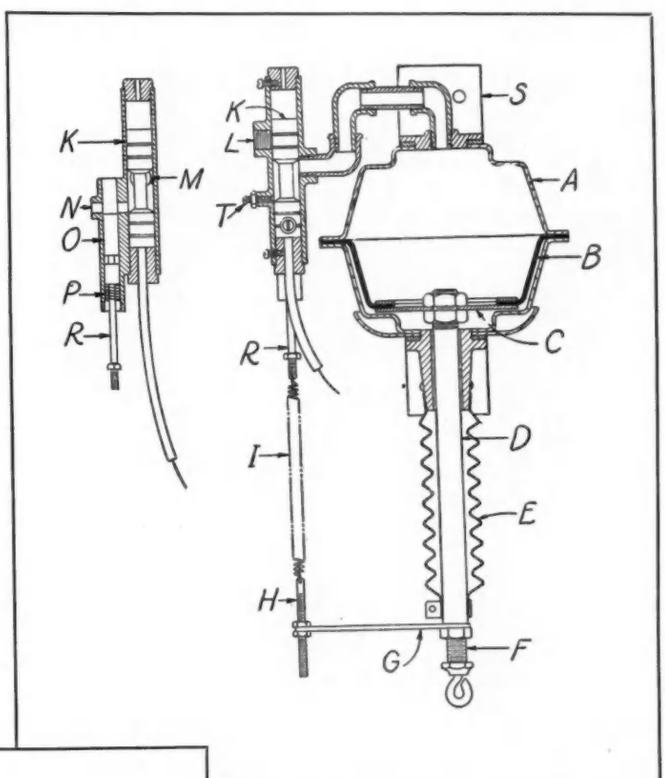
Wide Possibilities for Development

the operator; or a control mechanism may be provided whereby the vacuum in the cylinder or chamber is controlled by the position of the clutch pedal, the same as in vacuum-type brake boosters.

The first company to operate the clutch of a passenger car with the aid of the inlet vacuum was Minerva Motors of Antwerp, Belgium, which exhibited a new eight-cylinder sleeve-valve 40-hp. car at the Paris and London shows last fall. The Minerva company desired to reduce the travel of the brake and clutch pedals in order to increase the comfort of the driver. But a reduction of pedal-pad travel with the usual direct operation meant that greater effort would have to be applied to the pedal, and that was hardly the correct way to add to the comfort of the operator. This led to a consideration of power operation of the clutch pedal, and the problem was worked out in collaboration with the Societe Anonyme du Servo Frein Dewandre of Liege.

A unit was developed which combines a brake servo and a clutch servo and at the same time carries the two pedals. The Dewandre brake servo has been described previously in these pages. The two servos are both based on the same principle, and their combination in a single unit facilitates their installation. The starter and the brake servo-clutch servo combination are mounted symmetrically on opposite sides of the crankcase, which permits of the installation of the latter on cars with either right-hand drive or left-hand drive. It is claimed by the Dewandre company, manufacturers of the device, that operation of the Minerva with this combination servo gives the driver a sense of comfort never realized before and permits of smooth and progressive operation of the clutch, with only slight movement of the clutch pedal. The same applies to the brake pedal, and brake application is under perfect control.

A second point resides in the connection of the brake arm to the arm of the brake rigging. In order to eliminate the influence of displacements of the axle relative to the frame, the link or brake rod which ordinarily connects these two arms is here cut in two and has inserted in it a system of levers, which, being suspended from the chassis, are equally connected to the rear axle housing. The connection to the axle housing is effected by means of a Silentbloc joint, which requires no lubrication. The connection of the arm of the brake rigging on the chassis to this floating lever is effected at a point which is not affected by displacements of the floating lever; this arrangement does away with the need for distance rods and eliminates the transmission of movements of the rear axle to brake-operating pedal.



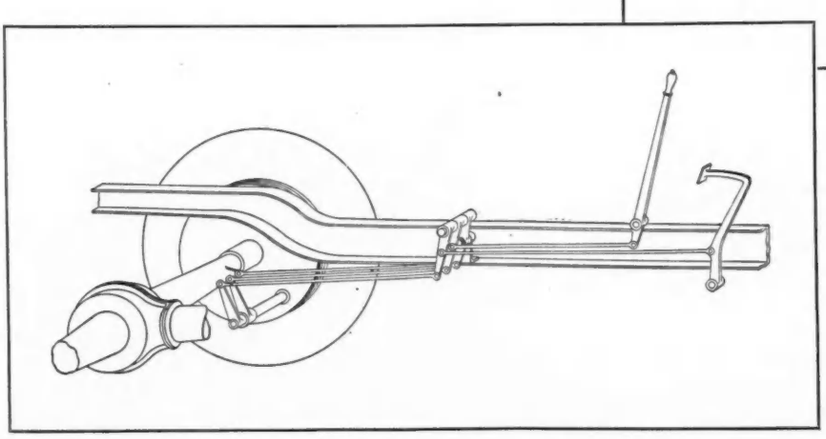


Fig. 3 (left)—Dewandre method of compensating for effect of spring motion on the brake setting + +

Fig. 4 (above)—Sectional view of Hill vacuum brake servo + + +

A, diaphragm chamber; B, diaphragm; C, piston; D, piston rod; E, rubber boot; F, swivel bolt; F, check valve control arm; G, check valve control arm; H, check valve adjusting rod; I, check valve control spring; J, Bowden cable; K, valve piston; L, port to intake manifold; T, bleeder screw; M, port to diaphragm chamber; N, port to atmosphere; O, check valve; P, check valve spring; R, check valve control rod; S, bracket for attachment to dash.

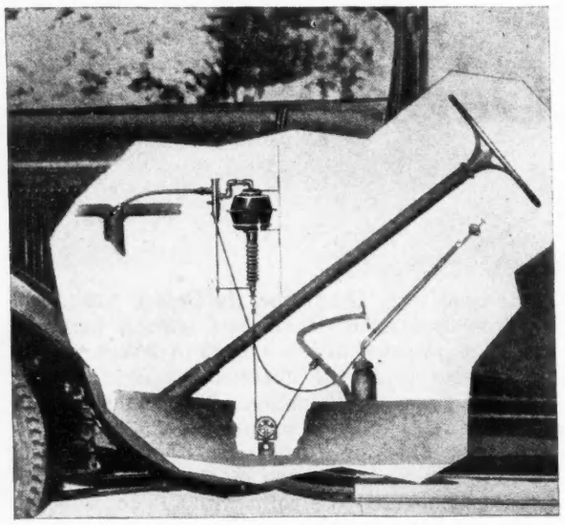


Fig. 5—Hill vacuum brake servo installed on car + + + + + + +

In heavy motor vehicles, in which adjustment of the brake linkage is affected by settling of the springs, this difficulty is completely eliminated by the arrangement described.

A vacuum clutch control has been worked out also by the Hill Engineering Corp. of Richmond, Va., and has been installed on numerous cars in the hands of private owners, as well as on buses; we understand, moreover, that several car manufacturers are at present trying it out on experimental cars.

The mechanism consists of a diaphragm chamber which is secured to the dash, in which there is a diaphragm provided with a central rod that extends through a bearing or guide formed on the lower half of the chamber and connects through a cable running over a pulley to the clutch pedal. Alongside of the diaphragm chamber is located a valve chamber containing a piston valve. This valve is connected by a wire mechanism to a button at the top of the gear-shift lever. By pressing this button down with the thumb, the piston valve is moved to a position in which it places the upper half of the diaphragm chamber in communication with the inlet manifold. Air is then sucked from the upper part of the diaphragm chamber, and the atmosphere pressing against the diaphragm from below forces it upward and thereby disengages the clutch.

Adjacent to the piston valve there is another, similar valve, referred to as an air valve. This latter connects through a coiled spring to an arm extending from the lower end of the diaphragm rod. When the diaphragm is raised through the evacuation of the upper chamber, the tension on the coiled spring connected to the air valve is reduced, and another spring inside the air valve then opens this valve to the atmosphere. When the button on top of the shift lever is then released, atmospheric air can rush into the diaphragm chamber, allowing the diaphragm to drop and the clutch to be engaged.

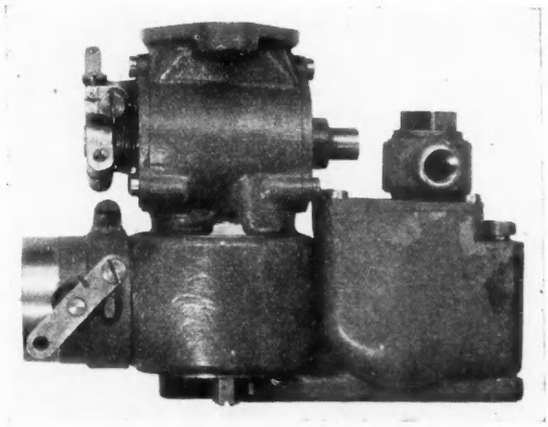
With this apparatus the driver needs not press the clutch pedal either in starting from a standstill or when changing gear. When about to start the car, he merely presses down the button in the shift-lever knob and then shifts into gear; upon then releasing the button the clutch takes hold gradually and the car starts up. The procedure is the same in shifting from one gear to another; first the button is depressed, then the gear is shifted and finally the button is released. The car can also be coasted by depressing the button in the shift-lever knob.

Smooth engagement of the clutch when the button is released is assured by the following means: As soon as the diaphragm moves down during the clutch-engaging motion, the tension on the coiled spring pulling on the atmospheric valve is increased. This causes the atmospheric valve to close gradually, thereby reducing the speed at which air can enter the diaphragm chamber, and slowing up the engagement motion. Before the clutch is fully engaged the atmospheric valve is completely closed, and air then can enter the diaphragm only through a small bleeder hole. This bleeder hole can be adjusted, and the speed of clutch engagement thereby controlled.

Juhasz Tri-Fuel Carburetor Uses Barrel-Type Throttle Valve

RIGHTS for the Juhasz tri-fuel carburetor in the United States have been acquired by a group headed by Louis Gold, and we understand that plans to manufacture the carburetor here are being completed. This carburetor has three carburetor chambers, each with its own nozzle, and uses a barrel-type of throttle valve instead of the conventional butterfly. This throttle is of such design that as it is opened, first one, then two, and finally all three carburetor chambers are opened to the carburetor outlet and are operative. Since this cuts down the range of air speeds through each carburetor chamber it lessens the difficulties of mixture control. Each of the nozzles is provided with an air-bleed or compensating hole.

One of the claims made for this carburetor is that it will take care of furnace oil or kerosene without special adjustment. It is recommended, however, that where these less volatile fuels are used, they be preheated by means of an electric coil, or else that a pilot jet be used which burns gasoline, the total fuel consumption then being five-sixths furnace oil or kerosene and one-sixth gasoline.



Luft Hansa Penetrating Manchuria With Air Mail-Passenger Service

(Continued from page 237)

be made partly by rail. After flying services have been established over the whole distance—which it is hoped to accomplish in 1932—the mails between Berlin and Shanghai will require only five to six days, instead of 12 to 14, as at present when the railroad is being used.

In discussing air services across the Atlantic it must be understood that at present no airplanes are being built anywhere that are capable of maintaining a service across either the Northern or the Southern Atlantic according to schedule and it probably will take three or four years more till such planes have been designed, built and sufficiently tested out.

The two fast steamers Bremen and Europa of the North German Lloyd, whose last port of call in Europe is Cherbourg, have the German mails for North America delivered to them there from Cologne by airplane. Both steamers are equipped with catapult planes, which are catapulted when the ships approach the American coast and deliver the mails before the steamers land. On the return voyage the planes are catapulted long before the English coast is reached. They deliver their mail at Southampton, from where it is taken to be forwarded by the night mail plane from London to Berlin, which delivers part of the mail in Cologne during the night and the remainder in Berlin the next morning. The saving in time effected in this way averages 20 hours in the direction toward America and 40 to 45 hours toward Europe. During 1931 particularly good times were made in the direction toward America.

It is the intention of the Luft Hansa to develop this system further by lengthening the flights of the catapulted planes and by making arrangements that the mails are taken on board not at the last port of call in Europe but at sea, which would necessitate that the plane be taken on board with the aid of drag sails or the mails be thrown off with suitable apparatus.

In connection with South Atlantic services the mail is carried by night trains to Stuttgart, and thence by the regular flying service to Barcelona, Spain. From Barcelona to Cadiz it is carried once per week by a special plane. There the mail is taken on board by seaplanes of the Luft Hansa which carry it to the Canary Islands. At the Canary Islands (Las Palmas) the mail is taken on board by passing German steamers of the Hamburg-South American Line. When these steamers pass the island Fernando Noronha off the South American coast, they transfer the mail to the airplanes of the Condor Syndicate, which latter distribute it to various stations along the South American coast.

This service, which was tested out in four flights during 1929, was carried out in twelve flights in each direction during the last business year, and was supplemented once by a flight of the dirigible Graf Zeppelin between Sevilla and Pernambuco. The German mails were delivered to the Graf Zeppelin in Sevilla by an airplane of the Luft Hansa, and they were transferred from the Graf Zeppelin at Pernambuco to the plane of the Condor Syndicate. In this way the time of the mail between Berlin and Rio de Janeiro can be reduced by five days. Without the use of the dirigible the mails require 9½ to 10 days between Berlin and Rio de Janeiro, which is about the same as the time required by the French Aeropostale company, which accomplishes the crossing of the ocean with its own very expensive motorships. The disadvantage of the German system lies in the fact that the German steamers do not always sail on the same day of the week, so that the closing of the mails for the combined airplane-steamer transport must be specially announced each time. The Aeropostale, employing its own ships, always sails on the same day of the week.

During the coming year the Luft Hansa plans to develop its South America service by transferring mails not only to the two German steamers on the South-America route but also to Italian steamers, and negotiations to that end are in progress.

In August and September of the current year there will be again a double combination service to Brazil and back by planes of the Luft Hansa and the Graf Zeppelin.

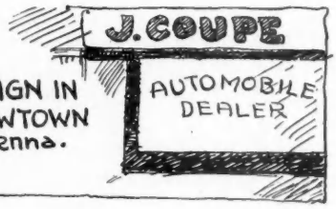
In connection with the South-Atlantic problem the fact is of interest (says the report) that not only in Italy but also in France—due no doubt to the collapse of The Aeropostale Company—there have been recently serious endeavors looking to closer cooperation with Germany on the road to South America. If a definite proposal were made the Luft Hansa would not disregard it, in view of the facilities it would afford in many ways. The first step to be taken would be to eliminate the competition on the Brazilian coast due to flying on parallel lines of German, French and U. S. airplanes, through a simple pool arrangement and through an agreement concerning common ground equipment, which has the support of all of the operators, at least in principle.

Generation of Electricity in Great Britain

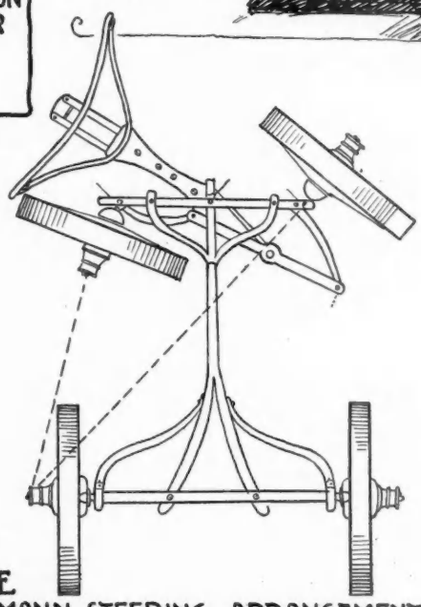
AUTOMOBILE engineers are interested in the efficiencies obtained in other lines of engineering where power is generated by the combustion of fuels, and some pertinent data have been published in England recently in a report on Generation of Electricity in Great Britain—Return of Fuel Consumption and Units Generated. The highest thermal efficiency in an oil engine station, 30.18 per cent, was obtained at Buxton Corporation, while the highest thermal efficiency of a steam station, 23.64 per cent, was obtained at the Kearsley Station of the Lancashire Electric Power Company. These figures are not peak figures but average figures of the stations mentioned over a considerable period. They are over-all efficiencies from the coal pile or fuel tank to electric energy at the generator terminals. The efficiencies are increasing year by year and are highest for the largest and most modern stations, as would be expected.

Automotive Oddities—By Pete Keenan

DR SAMUEL JOHNSON
WHO WROTE THE ENGLISH DICTIONARY, PROBABLY WAS THE GREATEST CYNIC OF AUTOMOTIVE AND AVIATION POSSIBILITIES THAT EVER LIVED.

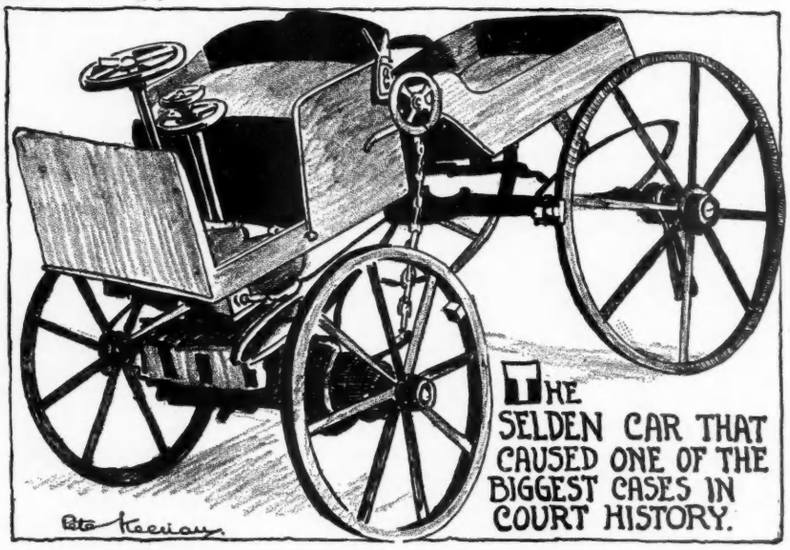


SIGN IN NEWTOWN Penna.



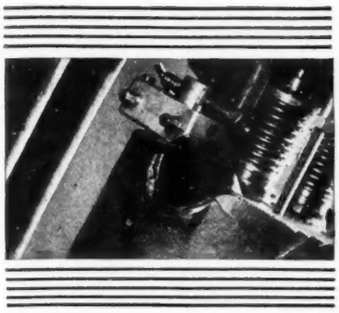
THE ACKERMANN STEERING ARRANGEMENT WAS NOT INVENTED BY ACKERMANN, BUT BY GEORGE LENKENSPERGER, OF MUNICH. (Ackermann got the patent on it in England in 1818.

AN ORDER WAS ISSUED TO STOP COPS SLEEPING IN PARKED CARS IN OIL CITY, PENNA 1906.

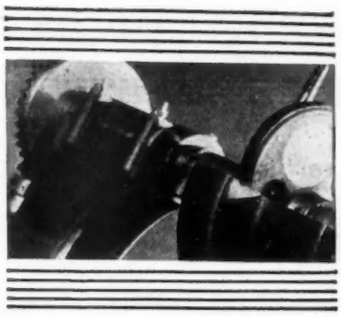


THE SELDEN CAR THAT CAUSED ONE OF THE BIGGEST CASES IN COURT HISTORY.

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



Hudson Forms New Promotion Division

It Will Be in Charge of W. A. James

DETROIT, Aug. 13—An advertising and sales promotion division is being formed by the Hudson Motor Car Co. under the direction of William A. James, assistant sales manager, according to an announcement from Chester G. Abbott, general sales manager of the company. Mr. James will continue his present duties as assistant sales manager, according to the announced plans.

Hudson also announced this week, that beginning with Aug. 17 there will be available as optional equipment on the Hudson and Essex lines of cars an automatic starting device called the "Startix." This device will start the engine when the ignition switch is turned on, without further attention from the driver of the car. Should the engine stall, the starting mechanism is automatically brought into play.

Continental Shifts Plant

DETROIT, Aug. 13 — Operations of the Continental Motors Corp. are being temporarily concentrated in the Muskegon plant, owing to reduced manufacturing schedules. The general offices, tool rooms, and aircraft engine department of the corporation will continue to be operated from Detroit. Plans for the Detroit plant will be announced shortly, it has been stated.

Denies Houdaille Offer

CHICAGO, Aug. 11—Claire L. Barnes, president Houdaille-Hershey Corp. yesterday emphatically denied published reports that negotiations for the acquisition of the company by either Ford or General Motors are under way. The report had originally appeared in Chicago newspapers, without confirmation of any sort.

TWO automobile manufacturers are definitely committed to a program of stock-car racing during the fag end of this season and through the next. The names of the companies . . . well, you won't hear much about that unless the jobs they turn out get up into the money somewhere. Then, with eclat, elan, verve, and all that sort of thing, it will suddenly develop that the racing car which gave such a wonderful performance all season was equipped with a Squilch-Super CD engine, which was standard in all particulars except for the bore, stroke, pistons, crankshaft, valves, timing, fuel, and a few minor details like that. A third company also dallies with the idea of officially risking the products of its engineering skill on the roaring roads. Discounting the above remarks, we are glad to see that much interest on the part of the manufacturers, being among those who would rather smell burned castor oil than taste it in any form. * * * "The Houghton Line" will be published again. There are about a quarter of a million industrial executives to whom the announcement will bring a definite sense of pleasurable anticipation. When Charles E. Carpenter was president of E. F. Houghton & Co., Philadelphia, and edited the "Line," each number of this queen of house organs was awaited with as much impatience as, say, the latest issue of "Ballyhoo." Mr. Carpenter's editing was unconventional, terse, and there was plenty of good, salty horsemeat for the customers. Louis E. Murphy, a lifelong associate of Carpenter's, will revive the "Line." Want a copy? Let us know. * * * the new Plymouth has busted the transcontinental speed record, with L. B. Miller as pilot. The trip was made from Oakland, Calif., to New York and return: 6287 miles, 132 hr., 9 min., 47.52 m.p.h.; Western Union timing, which has no relation to the speed at which messenger boys travel. * * * Sam Taylor has been appointed pilot of the big Ford tri-motor which Firestone operates for its executives and for advertising. * * * Charles F. Barth, who retired recently as vice-president in charge of manufacturing for Chevrolet, has been voted a life membership in the Industrial Mutual Association of Flint, Mich. * * * Vincent Bendix has donated a trophy for the transcontinental free-for-all race which will be a feature of the National Air Races in Cleveland, Aug. 29-Sept. 7. Mr. Bendix also came through with some additional prize money, so that the total awards for winning pilots will be around $15,000. * * * Sears, Roebuck has begun construction of a complete automobile servicing station in connection with one of its Chicago retail stores. The first unit will be an experiment, to be followed, if successful, with the construction of similar servicing units in connection with all of the company's Class A retail stores. * * *—H.H.

THE NEWS TRAILER

Curtiss-Wright Reduces Losses

June Quarter Shows Considerable Improvement

NEW YORK, Aug. 13—The consolidated statement of the Curtiss-Wright Corp. shows a loss of $1,463,154 for the six months ended June 30, as compared with a loss of $5,351,661 for the corresponding six months of last year. In the second quarter the loss amounted to $375,030, as compared with a loss of $3,730,740 for the corresponding quarter of last year.

The two chief subsidiaries of the corporation considerably improved their position during the second quarter of this year. The Curtiss Aeroplane and Motor Corp. reported a profit of $35,545 for the half year, and the Wright Aeronautical Corp. reduced its loss figure to $39,575.

Foreign Car Stocks Held to Normal

WASHINGTON, Aug. 13—Cabled reports to the Automotive Division, Department of Commerce, showing the condition of stocks of motor vehicles in foreign countries, indicate a large percentage of these stocks to be in normal or low condition. The complete summary of the cabled reports, which was released by the Automotive Division today, will be published in full in next week's issue of *Automotive Industries.*

Petroleum Imports Off

NEW YORK, Aug. 12—Imports of petroleum at the principal ports in the United States for the month of July averaged 211,903 bbl. daily, according to the American Petroleum Institute. This compares with the daily average of 215,267 bbl. for June.

Imports for the week ended Aug. 8 averaged 120,857 bbl. daily, as compared with a daily average of 191,143 bbl. for the week ended Aug. 1.

Men of the Industry and What They Are Doing

Gartley Becomes Distributor

P. C. Gartley has been appointed distributor of Willys and Willys-Knight motor cars and trucks for the Chicago district. Mr Gartley has been identified with the industry in various executive capacities for more than 20 years and he resigns as general sales manager of Willys-Overland to launch his own company, P. C. Gartley, Inc. General offices are at 19 West Twenty-sixth St. and territory embraces the entire Chicago area.

Mr. Gartley went with Splitdorf Electrical Company in Los Angeles in 1910 as a mechanic, later joining the EMF company as a file clerk, becoming retail sales manager. He next went to the Maxwell company as wholesale representative, later heading a distributing organization in Spokane and Seattle. After the war, in which he served, Mr. Gartley was with Maxwell in Milwaukee as retail sales manager and filled the same position with Willys-Overland when that company established a Milwaukee branch. He later became general sales manager. Associated with him in the Chicago distributorship are Douglas M. Herrick, vice-president and secretary and George M. Adams, treasurer.

Graham Shifts Herron

Milo D. Herron, who has been manager of the commercial car division of Graham-Paige Motors Corp. since July, 1929, has been appointed district manager over the territory comprising Maryland, Virginia and the District of Columbia, with headquarters at Washington. In his new capacity Mr. Herron will be in full charge of sales to United States Government departments, of both passenger and commercial cars.

DiVco Names Mead

L. D. Mead has been appointed chief engineer of DiVco-Detroit Corp. He was formerly designing engineer of trucks and buses at Studebaker and Pierce-Arrow, and chassis engineer for Dodge-Graham. In the early days he was assistant engineer of Barley Motors Co., builders of "Roamer," and chief engineer of Lewis Spring & Axle Co., Jackson, Mich., manufacturers of "Hollier Eight."

Studebaker Names Lucas

Appointment of Ottis Lucas as general advertising manager of the Studebaker Corp. has been announced by J. M. Cleary, sales manager. Mr. Lucas succeeds M. F. Rigby, who died May 23 after an extended illness.

Mr. Lucas has been associated with Studebaker three years in various sales promotional activities. Prior to this he was sales manager and sales promotion manager of Marmon, and sales manager for Lincoln.

Auburn Names de Sakhnoffsky

Count Alexis de Sakhnoffsky, four times winner of the European Grand Award, director of design for Hayes Body Corp., has been retained as a member of the body engineering staff of the Auburn Automobile Co. In the future he is to contribute to the coachcraft of both Auburn and Cord.

He is now at the Auburn factory and will spend much of his time with the body engineers of Auburn and Cord, but remains with Hayes Body Corp. as director of design and will continue to serve as chief body engineer of De Vaux-Hall Motors.

Studebaker Shifts Clark

The appointment of C. L. Clark as special representative for the Studebaker Pierce-Arrow Export Corp. has been announced. Mr. Clark, who was connected with the Studebaker in the United States for a number of years, will represent the export corporation in India. He will maintain headquarters in Bombay, India, and will be attached to the staff of Dewey W. Smith, regional director for the corporation in the Orient and Far East.

Budd Transfers Godsell

Lester E. Godsell has been transferred to the truck sales department of the Budd Wheel Co. and hereafter will devote his efforts to manufacturers' equipment sales in New York. For several years Mr. Godsell has been traveling Eastern representative for the Budd Wheel Co.

Carboloy Appoints Howell

E. C. Howell has been appointed advertising manager of Carboloy Co., Inc. He was formerly advertising manager of P. R. Mallory & Co., Inc., Indianapolis, Ind.

Stadig Plans Engine Output

SPRINGFIELD, MASS., Aug. 10—Stadig Aeronautical Corp., a Delaware corporation with authorized capital of $200,000, is conducting experimental work on airplane and outboard motors, preparatory to manufacturing early next year. Parts will be made on contract and assembled at Chicopee Falls. Units containing five, seven and nine cylinders developing 75, 105 and 140 cylinders, respectively, will be produced.

Steel Mills Await Turn in Market

Prevailing Demand Held Little Different From July Level

NEW YORK, Aug. 13—The leading steel producer's unfilled tonnage statement, which was made public on Monday, and which showed a decrease of 74,507 tons in the backlog during July to 3,404,816 tons, is being commented on favorably rather than otherwise in the steel market. Analysis shows that new orders were booked in July at about the same rate as during the two preceding months, excess of shipments over bookings having been much more marked in May and June than last month.

At the present rate unfilled obligations represent approximately six months' operations. Prevailing demand is generally thought to differ very little from that in July, and because of the relative lateness of the labor holiday, which is expected to usher in a change for the better, not much of a quickening in buying is looked for over the remainder of this month, although finishing mills confidently look for some betterment during the last week of August.

Some of the Mahoning Valley sheet mills are reported to be in receipt of somewhat more satisfactory specifications from one of the Detroit motor car manufacturers. Other sheet mills are reported to have lowered their operating schedules pending the accumulation of a more satisfactory volume of specifications.

The hot-rolled strip market is said to be somewhat more firmly established on the basis of the recent advances to 1.55 cents, Pittsburgh, for wide, and 1.65 cents for the narrower strips. These are the price levels which were in effect during the first quarter of the year. Little is heard about new business in black sheets, although producers claim to be adhering strictly to the higher prices on what orders come to them. Recent sales of sheet bars at $1 per ton below the going $29, Pittsburgh, Youngstown or Cleveland, quotations, are said to have been confined to off-grade material.

Pig Iron—There is very little inquiry for round lots, what business there is being for one or two carloads as needed by foundries. Prices are unchanged.

Aluminum—Middle West specialists in remelted aluminum report a slight improvement in the demand over July. Prices are riding on an even keel. Virgin metal is quotably unchanged, but much of it is moving into consumers' hands in the form of pistons and other parts, with the cost of the metal and the foundry work lumped.

Copper—Dull and unchanged.

Tin—Output in the Federated Malay States has been found to exceed the quota set by the tin restriction scheme, and the government has arranged for the smelteries to hold the excess in trust during this month. Curtailment during the quarter ending Nov. 30 is to be increased 10 per cent. The market here is firm, prompt Straits having opened the week at 25.18 cents.

Wholesale Automobile Financing Nears 1929 Figure

WASHINGTON, Aug. 14—The mid-year summary of automobile financing issued this week by the Bureau of the Census shows the dollar volume of wholesale financing for the first six months of 1931 to be very close to that of the first six months of 1929, although a considerable decline was shown from the figure for the first six months of 1930. The complete figures on automobile financing for the first six months of the current year, and for the full years 1928-1930, as reported to the Bureau of the Census follow:

YEAR AND MONTH	WHOLESALE FINANCING VOLUME IN DOLLARS	RETAIL FINANCING											
		TOTAL			NEW CARS			USED CARS			UNCLASSIFIED		
		Number of Cars	Total Volume	Average Per Car	Number of Cars	Total Volume	Average Per Car	Number of Cars	Total Volume	Average Per Car	Number of Cars	Total Volume	Average Per Car
1928													
January		104,110	$52,321,849	$503	49,989	$32,489,265	$650	40,963	$13,597,113	$332	13,158	$6,235,471	$474
February		132,262	64,984,171	491	63,798	40,557,252	636	52,565	16,624,579	316	15,899	7,802,340	491
March		195,636	93,528,323	478	96,921	61,072,572	630	76,423	23,081,135	302	22,292	9,374,616	421
April		234,653	113,495,089	484	117,751	74,435,217	632	88,435	26,927,624	304	28,467	12,132,248	426
May	DATA	272,0[illegible]8	132,109,832	486	157,259	86,416,000	630	105,642	31,671,736	300	29,197	14,022,096	480
June	NOT	263,927	128,101,724	485	131,694	83,198,055	632	104,451	31,618,502	303	27,782	13,285,167	478
Total (6 mos.)	AVAILABLE	1,202,686	584,540,988	486	597,412	378,168,361	633	468,479	143,520,689	306	136,795	62,851,938	459
July		253,001	122,891,728	486	125,507	79,690,883	635	97,535	29,295,312	300	29,959	13,905,533	464
August		252,211	121,713,370	483	124,729	78,664,305	631	98,534	29,997,191	304	28,948	13,051,874	451
September		209,475	102,365,172	489	100,659	64,688,265	643	84,556	26,092,723	309	24,260	11,584,184	478
October		215,961	104,174,536	482	101,422	64,917,275	640	90,668	27,997,610	309	23,871	11,259,651	472
November		180,655	86,683,370	480	84,501	52,994,131	627	74,577	23,241,662	312	21,577	10,447,577	484
December		152,155	72,935,130	479	63,162	41,666,345	660	69,414	22,044,777	318	19,579	9,224,008	471
Total (Year)		2,466,144	$1,195,304,294	$485	1,197,392	$760,789,565	$635	983,763	$302,189,964	$307	284,989	$132,324,765	$464
1929													
January	$36,888,380	156,284	$75,152,519	$481	78,419	$48,638,617	$620	68,851	$22,737,752	$330	9,014	$3,776,150	$419
February	47,958,519	190,051	90,746,154	477	103,432	61,846,030	598	76,480	24,600,855	322	10,139	4,299,269	424
March	61,163,820	304,477	141,406,570	464	166,110	96,685,654	582	121,224	37,829,278	312	17,143	6,891,638	402
April	74,882,776	410,348	172,222,691	420	205,143	116,677,764	569	184,872	47,115,425	255	20,333	8,429,502	415
May	72,226,505	401,521	184,377,607	459	212,692	125,032,231	588	168,624	50,990,170	302	20,205	8,355,206	414
June	63,408,612	386,084	179,647,131	465	203,796	121,816,723	598	163,953	50,278,682	307	18,335	7,551,726	412
Total (6 mos.)	356,528,612	1,848,765	843,552,672	456	969,592	570,697,019	589	784,004	233,552,162	298	95,169	39,303,491	413
July	61,832,669	390,461	180,427,998	462	211,354	124,571,541	589	162,370	49,017,458	302	16,737	6,838,999	409
August	69,959,084	349,441	163,460,575	468	184,010	111,107,499	604	149,503	45,763,684	306	15,928	6,589,392	414
September	60,194,621	299,911	129,048,226	430	158,027	93,771,181	593	127,593	29,469,512	231	14,291	5,807,533	406
October	63,640,986	277,384	126,236,379	455	132,187	80,232,568	607	134,752	41,646,973	309	10,445	4,356,838	417
November	44,633,376	210,112	94,718,943	451	96,157	58,128,601	605	103,888	32,180,887	310	10,067	4,409,455	438
December	21,001,179	171,395	79,886,217	466	74,190	47,988,851	647	89,721	28,612,541	319	7,484	3,284,825	439
Total (Year)	$677,790,527	3,547,469	$1,617,331,010	$456	1,825,517	$1,086,497,260	$595	1,551,831	$460,243,217	$297	170,121	$70,590,533	$415
1930													
January	$52,447,062	165,666	$73,473,303	$444	78,554	$45,155,063	$575	80,758	$25,536,823	$316	6,354	$2,781,417	$438
February	61,244,849	199,323	85,564,278	429	95,433	52,926,897	555	95,436	29,128,477	305	8,454	3,508,904	415
March	77,547,813	315,443	123,587,977	392	139,189	77,235,940	555	166,577	42,404,796	255	9,677	3,947,241	408
April	85,337,838	346,590	146,700,652	423	171,032	93,935,742	549	164,063	48,782,480	297	11,495	3,982,430	346
May	83,599,772	294,290	115,225,047	392	115,563	68,181,709	590	168,240	42,844,239	255	10,487	4,199,099	400
June	53,802,394	340,872	138,207,191	405	159,649	91,122,753	571	170,404	42,983,279	252	10,819	4,101,159	379
Total (6 mos.)	413,979,728	1,662,184	682,758,448	411	759,420	428,558,104	564	845,478	231,680,094	274	57,286	22,520,250	395
July	55,319,248	286,745	118,819,832	414	130,659	73,458,525	562	149,706	42,676,831	285	6,380	2,684,476	421
August	45,314,862	247,320	102,781,226	416	111,053	62,988,915	567	129,583	37,117,944	286	6,684	2,674,367	400
September	45,310,662	219,072	90,296,562	412	92,086	52,819,786	574	121,518	35,209,554	290	5,468	2,267,222	415
October	35,878,312	200,787	81,256,310	405	78,382	45,631,545	582	118,142	33,755,445	286	4,263	1,869,320	438
November	29,632,626	152,338	60,197,277	395	54,682	31,805,159	582	94,082	26,841,820	285	3,574	1,550,298	434
December	35,550,040	167,299	65,967,172	394	61,888	35,342,181	571	101,076	28,838,221	285	4,335	1,786,770	412
Total (Year)	$660,985,478	2,935,745	$1,202,076,827	$409	1,288,170	$730,604,215	$567	1,559,585	$436,119,909	$280	87,990	$35,352,703	$402
1931													
January	$40,164,672	160,620	$61,734,059	$384	58,519	$32,956,741	$563	97,878	$27,245,446	$278	4,223	$1,531,872	$363
February	49,812,959	173,108	66,180,619	382	67,616	36,865,326	545	100,754	27,721,946	275	4,738	1,593,347	336
March	63,089,716	237,429	92,054,520	388	102,686	55,035,647	536	128,371	34,704,239	270	6,372	2,314,634	363
April	71,194,343	290,270	113,045,193	389	133,376	70,560,629	529	149,188	39,564,067	265	7,706	2,920,497	379
May	72,629,682	278,118	109,426,139	393	126,745	68,571,359	541	142,847	37,793,229	265	8,526	3,061,551	359
June*	57,840,035	(1)264,160	104,089,939	394	114,565	63,244,647	552	141,247	37,746,125	267	8,348	3,099,167	371
Total (6 mos.)	$354,731,407	1,403,705	$546,530,469	$389	603,507	$327,234,349	$542	760,285	$204,775,052	$269	39,913	$14,521,068	$364

* Preliminary.
(1) Of this number 43.37 per cent were new cars, 53.47 per cent used cars, and 3.16 per cent unclassified.

Japanese Study Industry

WASHINGTON, Aug. 12 — While making no specific recommendations, the three special committees of the Japanese Automobile Investigation Board, created to study the possibilities of a domestic motor car industry, at the close of their first meeting included in their report an item relating to the revision of the present transportation regulations so as to encourage the use of domestic vehicles according to advices to the Automotive Division of the Bureau of Foreign and Domestic Commerce.

The committees also made reference to the extending of special tax concessions to domestic automobiles and the protection of the domestic industry, it is stated.

The board was created at the last session of the Japanese Diet to study existing conditions with a view to the establishment of an automobile industry in Japan and an appropriation of 153,000 yen was made to carry out the investigations. The Minister of Commerce and Industry was named chairman and committees were formed to make the necessary studies.

The program of the board calls for investigations and research covering all phases of the automotive situation in Japan, with a view to the development of an industry which would operate on a production scale of at least 5000 vehicles per year, it has been reported.

Used Car Value Reset in Tables

Current Issue of "Brown Book" Revises Former Standards

DETROIT, Aug. 13—In its researches on used car depreciation, the current Used Car Brown Book gives the depreciation in used-car prices for six 12-month periods, in a table, as follows:

	Per Cent Depreciation			
Year of Model	Year Ended Sept. 15 1930	Year Ended Dec. 15 1930	Year Ended Mar. 15 1931	Year Ended June 15 1931
1924	....	....	32.4	30.4
1925	48.6	44.0	47.2	44.1
1926	43.9	49.0	46.0	43.2
1927	42.0	40.2	45.9	40.2
1928	30.3	30.4	32.2	29.8
1929	30.0	27.9	28.9	28.2
1930	....	....	31.2	25.0

The study indicates that 1930 models have been depreciating about 25 per cent a year, or a trifle over 2 per cent a month, while 1925 models have been depreciating about 44 per cent a year, or nearly 4 per cent a month.

The value in a used car evaporates at a rate of from 2 per cent to 4 per cent a month. Used cars are like fruits and fresh vegetables carried by a grocer—they are perishable goods. Hence the necessity of speed in reconditioning the cars, advertising them, and selling them.

The average depreciation rate for the year ended June 15, 1931, has been 34.4 per cent. For the year ended June 15, 1930, the average depreciation rate was 35.4 per cent.

Promotes Used Truck Sales

DETROIT, Aug. 12—As a result of a survey conducted to determine the demand for used trucks in every section of the United States, Dodge Brothers Corp. has compiled a "Fundamentals of Merchandising Used Trucks" program that is to be sent to their dealers over a period of five months as a means of increasing their profits in this field.

The complete program is divided in five sections, each a monthly "lesson" on merchandising used trucks. First, "Organizing the Job"; second, "Buying the Used Truck"; third, "Reconditioning the Used Truck"; fourth, "Advertising and Displaying the Used Truck"; and fifth, "Selling the Used Truck."

Two Divisions Active

CINCINNATI, Aug. 13—Aluminum Industries, Inc., reports capacity operations in the subsidiary plant at St. Cloud, Minn., in the valve division, while the parent plant is working night shifts in the foundry division in order to step up production to meet demands from the new-car field.

Reo Reports Loss

DETROIT, Aug. 10—Reo Motor Car Co. has reported for quarter ended June 30, 1931, net loss of $151,451 compared with net loss of $420,832 in the first quarter and with $173,961 in the second quarter 1930.

Net loss for the first half of 1931 totals $572,283 against a net loss of $349,398 for the first half of last year.

Evans Reports Profit

DETROIT, Aug. 10—Evans Products Co. has reported net earnings for the first six months of the current year ended June 30, at $6,980 after all charges including Federal taxes. This compares with $97,769 for the corresponding period of 1930. The current year's earnings are equal to approximately .03 cents per share on 244,494 shares of outstanding capital stock in comparison with per-share earnings of 40 cents for the same period a year ago.

Packard Reports Loss

DETROIT, Aug. 11—Packard Motor Car Co. has reported for six months ended June 30, a net loss of $90,120 after all charges, including depreciation, compared with net profit of $5,528,837 in the first half of 1930.

Net loss for the second quarter was $203,125 compared with net profit in the first quarter of $113,004 and with net profit in the second quarter of 1930 of $2,874,590.

Packard Ships 1996

DETROIT, Aug. 11—Packard Motor Car Co. shipments during July totaled 1996 units, the largest for any one month since last October, according to H. W. Peters, vice-president in charge of distribution.

"Expectations are that August business will exceed July and that September will witness the beginning of a good fall selling season," said Mr. Peters.

I.H.C. Producing New Tractor

CHICAGO, Aug. 10—International Harvester Company has begun regular production of a new larger and powerful model of its Farmall tractor at its Rock Island plant. Production will be on a limited schedule and for the present will not involve increased working force or number of hours worked weekly.

Timken Axle Reports Loss

DETROIT, Aug. 11—Timken-Detroit Axle Co. and subsidiaries has reported for six months ended June 30, a net loss of $275,178 after depreciation and all charges, compared with net profit of $655,427 in the first half of last year.

Current ratio as of June 30 was better than 11 to 1, as compared with 8.5 to 1 on June 30, 1930.

Rubber Consumpti Ahead of July, '30

Imports Also Ahead of Last July, but Below June Figure

NEW YORK, Aug. 13—Consumption of crude rubber by manufacturers in the United States for the month of July is estimated to be 31,937 long tons as compared with 29,245 long tons for July a year ago and 37,916 long tons for June of this year, according to statistics released by the Rubber Manufacturers Association.

Imports of crude rubber for July amounted to 41,004 long tons, a decrease of 10.4 per cent under the June figure of 45,776 long tons, although 20.3 per cent above July, 1930.

The association estimates total domestic stocks of crude rubber on hand July 31 at 234,822 long tons, an increase of 3.9 per cent over June, and 54.5 per cent over July 31, 1930.

Crude rubber afloat for the United States ports on July 31 is estimated at 66,873 long tons as against 69,421 long tons on June 30 and 58,326 long tons on July 31, 1930.

M.E.A. Elects Two

NEW YORK, Aug. 12—The Motor and Equipment Association has admitted to membership, in division "B," the Aero Equipment Co., Bryan, Ohio, and the Dill Mfg. Co., Cleveland, Ohio.

Spicer Reports Loss

NEW YORK, Aug. 12—Spicer Mfg. Co. and subsidiaries report net loss for the six months ended June 30 of $279,830. This compares with a profit of $417,943 before taxes for the first half of last year. For the June quarter, the company shows a profit of $30,523, as compared with $214,150 for the corresponding quarter of last year.

Fairchild in Production

NEW YORK, Aug. 12—Fairchild Aviation Corp., Hagerstown, Md., has gone into production on a schedule of 10 per month on F-22 light airplanes. This plane first made its appearance at the All-American Aircraft Exposition in Detroit last April.

This company will also go into production, through its subsidiary, the Fairchild Aerial Camera Corp., on the Speak-O-Phone. This is an instrument for the electrical transcription of sound on blank disks of aluminum alloy, which may be reproduced on any phonograph.

Plant Ordered Sold

RICHMOND, IND., Aug. 12—The inventory and equipment of the Jenkins Vulcan Spring Co. will be sold at public auction Sept. 15, by order of the stockholders.

Gasolines Meet Government Tests

Bureau of Mines Survey Shows High Rating for Fuels

WASHINGTON, Aug. 11—The great majority of the "regular-price" gasolines sold at service stations throughout the United States pass the requirements of the new specification for United States Government motor gasoline as indicated by a survey of commercial motor car fuels just completed by the United States Bureau of Mines, Department of Commerce. The largest percentage of failure to meet the government specification occurred in connection with the sulphur requirement: 15.5 per cent of the gasolines that were sold at the "regular" price or below failed to pass the requirement which limits the sulphur content to 0.10 per cent. No sample failed to pass the corrosion test, four samples failed to meet the distillation requirements, and four samples had vapor pressures in excess of the maximum that is permitted under the federal specification, which is 12 lb. per sq. in.

That the volatility of commercial gasoline sold last March was noticeably higher than that of the gasolines which were sold during August of the previous year is concluded by comparing the results of the Reid vapor pressure test and the distillation test, made on samples collected last March, and the results obtained during the survey of August, 1930.

The gasoline survey in which these samples were obtained is the twenty-third semi-annual survey that has been made by the Bureau of Mines. In this survey a total of 312 samples were collected by Bureau of Mines engineers or chemists directly from pumps at service stations in 20 cities throughout the United States, and analyzed at the Petroleum Experiment Station of the Bureau at Bartlesville, Okla. Of these samples, 207 were "competitive-price gasolines," that is, they were gasolines that are sold at the "regular" service-station price or below; 105 samples of premium-price motor fuels also were obtained.

British Bus Travel Increases

WASHINGTON, Aug. 11—A material increase in the traffic and revenue of bus service operated by the British railroads, in contrast to the decline in the rail business, is indicated by railway returns for 1930, published by the British Ministry of Transport and forwarded to the Commerce Department.

Returns to Old Position

Kenneth S. Clapp has returned as director of sales of the United States Air Compressor Co., Cleveland.

Financial Notes

Moto Meter Gage & Equipment Corp. and subsidiaries report net loss for the first half of the current year of $190,314. This compares with loss of $176,574 for the first half of 1930.

Loss for the June quarter was $77,101, as compared with loss of $119,179 for the corresponding quarter of a year ago.

United American Bosch Corp. reports net loss for the June quarter of $177,204, as compared with profit of $135,559, or 64 cents a share, reported by American Bosch Magneto Co. for the corresponding quarter of last year.

Loss for the first half of the current year was $267,052, as compared with loss of $273,916 for the corresponding period a year ago.

McCord Radiator and Mfg. Co. net earnings for the six months ended June 30 amounted to $27,422 after all charges including bond interest depreciation and reserves. This compares with net income afer charges and taxes for the six months ended June 30, 1930, of $115,142 or $3.98 a class A share. The company's business during the first half of 1931 experienced a substantial reduction from a year ago, but this was offset largely by economies in operation.

United States Rubber Co. reports net profit from operations, after interest but before depreciation, of $49,774, during the first six months of current year. Provision for depreciation was $4,709,976, resulting in a deficit for the period of $4,660,202.

Net sales for the period amounted to $60,540,047, as compared with $75,206,983 for the first six months of 1930.

Commercial Investment Trust reports net profit for the first half of the current year of $3,863,814, after all charges. This is equivalent to $1.26 a share on common stock, and compares with earnings of $4,467,797, or $1.47 a share for the first half of 1930.

Dayton Airplane and Engine Co. has acquired control of the American Aeronautical Corp., American licensees for the Savoia-Marchetti planes of Italian design, according to Enea Bossi, vice-president of Dayton. This control is obtained through the acquisition of 60 per cent of the capital stock of American Aeronautical.

Commercial Credit Co. and subsidiaries for the six months ended June 30, 1931, showed net income of $1.01 per share on the common stock after payment of all preferred stock dividends. Net income applicable to common compares with $1.10 for 1930 corresponding period, and was $1,056,069 as compared to a net income of $1,141,256 for the corresponding period of 1930.

Perfect Circle Co., Hagerstown, Ind., reports net profit in June 83 per cent above that for June, 1930, and 47 per cent ahead of that for June, 1929, according to C. Ray Teetor, treasurer. The gain is attributed to rapid strides made in replacement sales through automotive equipment jobbers.

French Exports Of Airplanes Up

First Five Months of This Year Better Than Same Period of Last

WASHINGTON, Aug. 10—French exports of aeronautical equipment during the first five months of the current year showed an increase over the corresponding period of 1930, according to a report received in the Commerce Department.

The total for the January-May period of 1931 was valued at approximately $3,225,000, as compared with $3,209,000 in the corresponding period of last year. Land planes constituted nearly all of the plane exports, only about $23,285 being for other types.

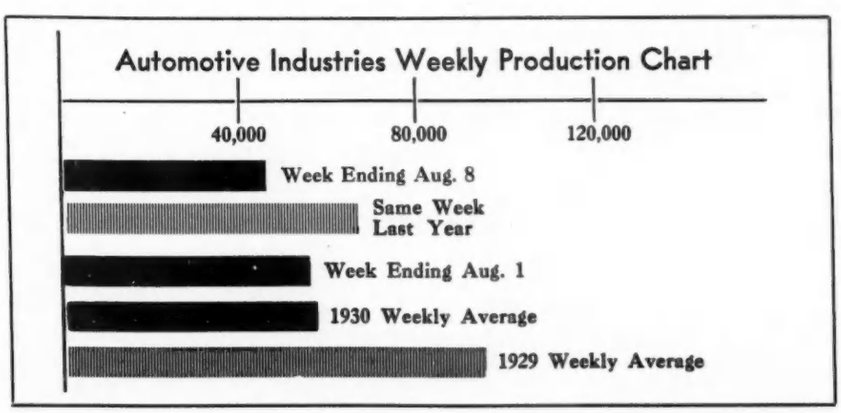
French imports amount to less than one-sixtieth of the value of the exports, only seven tons having been imported.

To Make C.-W. Engines

NEW YORK, Aug. 10—The Curtiss-Wright Export Corp. has negotiated a contract with the republic of Argentina giving that government the exclusive manufacturing rights within the country for the complete line of Curtiss-Wright engines. The agreement calls for the manufacture of at least 250 engines in Argentina over a period of five years, and includes an initial order of from 10 to 25 complete engines and a large quantity of spare parts to be built in the Curtiss-Wright plant at Paterson, N. J., for delivery within 90 days pending completion of the manufacturing drawings and special tools.

Sparton Offers New Horn

JACKSON, MICH., Aug. 12—The Sparks-Withington Co. is offering to the accessories trade the Model LA trumpet horn, which is standard equipment on the new series of Packard automobiles. The horns are intended to be sold in pairs and list at $44 a pair.



Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Aug. 12—General business throughout the country showed little change last week. There was a more hopeful feeling in some sections, but mid-summer dullness was still very noticeable. The abnormally hot weather stimulated the sales in some lines. Wholesalers and jobbers are making special efforts to increase their business, and some fall orders for clothing have been received.

MAIL ORDER SALES

Sales of one large mail-order house during July were 17.9 per cent below those a year ago, while sales during the first seven months of this year were 17.3 per cent below those in the corresponding period last year.

CAR LOADINGS

Railway freight loadings during the week ended July 25 totaled 741,752 cars, which marks a decrease of 15,803 cars below those during the preceding week, a decrease of 177,549 cars below those a year ago, and a decrease of 360,801 cars below those two years ago.

LUMBER ORDERS

Lumber orders of 827 leading hardwood and softwood mills during the week ended August 1 dropped below the curtailed level of production, according to the National Lumber Manufacturers Association. Orders were 5 per cent below production, although shipments were 7 per cent above.

WHEAT STOCKS

Stocks of wheat of the 1930 crop in interior mills and elevators on July 1, according to the Department of Agriculture, are estimated at 30,552,000 bushels, as against 60,166,000 bushels a year earlier. The 1925-1929 average of stocks on July 1 is 27,477,000 bushels.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended August 1 amounted to 2,500,650 barrels, as against 2,486,950 barrels for the preceding week and 2,515,300 barrels a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended August 8 stood at 69.5, as against 69.3 a week before and 69.5 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended August 5 were 18 per cent below those a year ago.

STOCK MARKET

The stock market last week was exceptionally dull, and the volume of trading was below 1,000,000 shares on each day. Prices were very irregular, with a tendency toward lower levels. New lows for the year were made by 78 issues.

BROKERS' LOANS

Brokers' loans in New York City during the week ended August 5 declined $44,000,000, bringing the total down to $1,346,000,000, which marks the lowest level since 1924.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended August 5 showed an increase of $6,000,000 in holdings of discounted bills and an increase of $3,000,000 in holdings of Government securities. Holdings of bills bought in the open market declined $1,000,000. The reserve ratio on August 5 was 83.9 per cent, as against 84.3 per cent a week earlier and two weeks earlier.

Bickett Closes Plant

WATERTOWN, WIS., Aug. 10—The Bickett Rubber Products Co., which recently completed a new plant and headquarters at Anderson, Ind., has decided to close its plant here and is transferring the machinery to Anderson. L. M. Bickett, who was in charge here, already has departed to take charge of the new plant of the company at Anderson.

Bank Files Ajax Claims

RACINE, WIS., Aug. 10—Judgment was filed August 7 in Circuit Court here in the foreclosure proceedings brought by the Chase National Bank of New York, trustee, against the Ajax Rubber Co., Inc., and a related corporation, the Racine Housing Association, showing that there is due the bank the sum of $1,409,015.35, being the unpaid principal and interest. The mortgaged premises and property, which include the large tire plant on Taylor avenue and the homes owned by the housing corporation, are ordered sold at public auction by the sheriff at any time after the expiration of a year from the filing and entry of judgment. Provision is made that the sale is to be held unless redemption has taken place in the meantime.

A. O. Smith Sales Are Holding Up

MILWAUKEE, Aug. 10—Sales of automobile frames by the A. O. Smith Corp. are reported to be holding up remarkably well, despite the fact that numerous large automotive shops are on vacation. It is understood that this increase in sales of the Smith company is largely based on the fact that orders from Chrysler for the new model Plymouth have reached large proportions.

Harley Delivers Army Order

MILWAUKEE, Aug. 10—The Harley-Davidson Motor Co. has started deliveries of 110 new motorcycles purchased by the United States Army for use at army posts in Hawaii, the Canal Zone and the United States, as well as to army airports and the quartermaster's department at Washington.

Thompson Has New Valve

CLEVELAND, Aug. 11—Thompson Products, Inc., has announced the development of a copper-cooled valve for use in heavy-duty and high-speed automobile engines. Copper is forged into the head and stem by an undivulged process, which is said to aid valve cooling. The valve sells at a price comparable to the conventional solid-stem type.

How the Industry Profited in First Half

	Change in Net Worth	Annual Rate of Return 1930	1931
A.	1.3	22.0	17.4
B.	11.2	6.4	3.5
C.	5.1	10.4	4.8

The figures above furnish a condensed statement of the financial condition of the automotive industry at the close of its operations for the first half of 1931. Line "A" refers to the General Motors Corp. Line "B" is a summary of the financial statements of 12 other producers of complete vehicles, and line "C" summarizes 24 producers of automotive parts and accessories. The change in net worth occurred in the period between statements as of Jan. 1, 1930, and Jan. 1, 1931, and it is upon these figures that that annual rate of return is based.

The National City Bank of New York, which compiled the figures for the August issue of its monthly news letter, points out that a number of companies which were in the red for the first quarter of this year, managed to show a profit for the second quarter. Other instances of this sort in the general industrial picture made the index of industrial profits for the second quarter show a more than seasonal increase.

Average Aero Ride Longer

CHICAGO, Aug. 10—The average airplane ride at the present time is 244 miles, contrasted with 153 miles a year ago, and average airplane fare is now approximately $17, show figures gathered by United Air Lines. This is in sharp contrast to three years ago when the average flight was approximately 30 miles, much of it being short sightseeing tours.

Hudson Advertising Shifted

DETROIT, Aug. 10—Advertising of Hudson and Essex cars will be transferred from C. C. Winningham, Inc., to Erwin Wasey & Co., effective November 1, according to William J. McAneeny, president and general manager of the Hudson Motor Car Co. Mr. Winningham has been associated with Hudson advertising for 21 years; for the past 10 years as head of the agency which bears his name. He will continue as a director of the Hudson Motor Car Co.

Murphy Adds New Finish

NEW YORK, Aug. 10—Murphy Varnish Co. of Newark is now marketing a vehicle varnish combination consisting of primer, surfacer, color coating, clear finishing and enamel.

Steel Treaters Plan Program

Meeting in Boston Will Be Held During National Metal Congress

Problems connected with the manufacture and use of sheet steel will be discussed as a special session of the American Society for Steel Treating in Boston on Wednesday, Sept. 23, during the week of the National Metal Congress and Exposition.

Seven technical papers, dealing with various phases of drawing, stamping and treating sheet metal will be presented. Joseph Winlock and A. E. Lavergne of the Edward G. Budd Manufacturing Co. will discuss "Some Effects of the Amount and Rate of Deformation on a Low Carbon Strip Steel." Other papers for this session include "Comparison of Sheet and Strip Steels for Difficult Stampings," Edward S. Lawrence, Duraloy Co.; "Plastic Drawing of Sheet Steel Into Shapes," E. V. Crane, E. W. Bliss Co., Brooklyn, N. Y.; "Thin Strip Steel for Deep Drawing," by H. T. Morton and I. A. Rummler, Hoover Steel Ball Co.; "Effect of Normalizing Upon the Grain Structure and Physical Properties of Automobile Sheet Steel," William F. McGarrity, Youngstown Sheet & Tube Co.; "Lubricants Used in Deep Drawing of Sheet Steel," by Maurice Reswick, Pennsylvania Lubricating Co., and "The Evaluation of the Drawing Quality of Extra Deep Drawing Sheets," by Thomas Dockray, Eastern Rolling Mill Co.

The complete program of the American Society for Steel Treating schedules 55 papers, including the annual Campbell Memorial Lecture, which will be presented this year by Dr. C. H. Herty, Jr., supervising chemist of the metallurgical department, United States Bureau of Mines, Pittsburgh.

The National Metal Exposition will be held in Boston, Sept. 21-25, at the Commonwealth Pier. Over 200 firms have reserved space in the show, which will cover 60,000 sq. ft., with displays of products of the metal industry.

Canadian Rails Fight Trucks

OTTAWA, ONT., Aug. 10 — Determined to fight motor truck competition to a finish, railway express companies are undertaking a comprehensive downward revision of tariffs.

Several schedules of reduced rates have already been filed with the Board of Railway Commissioners, and as a Dominion-wide survey of the situation is continued, further decreases are to be made.

McQuay-Norris reports net profit for the first half of the current year of $284,546, after all charges. This is equivalent to $2.44 a share on capital stock, and compares with earnings of $300,040, or $2.63 a share for the first half of 1930.

General Motors' Sales Through July

Sales to Consumers in the United States

	1931	1930	1929	1928
January	61,566	74,167	73,989	80,582
February	68,976	88,742	110,148	107,014
March	101,339	123,781	166,942	155,973
April	135,663	142,004	173,201	170,544
May	122,717	131,817	169,034	186,892
June	103,303	97,318	154,437	174,085
July	85,054	80,147	147,079	142,515
August	.....	86,426	151,722	151,105
September	.....	75,805	124,723	118,113
October	.....	57,757	114,408	109,789
November	.....	41,757	68,893	70,414
December	.....	57,989	44,216	25,435
Total	.....	1,057,710	1,498,792	1,492,461

Sales to Dealers in the United States

	1931	1930	1929	1928
January	76,681	94,458	95,441	96,845
February	80,373	110,904	141,222	141,642
March	98,943	118,081	176,510	168,107
April	132,629	132,365	176,634	161,720
May	136,778	136,169	175,873	170,388
June	100,270	87,595	163,704	154,912
July	78,723	70,716	157,111	135,412
August	.....	76,140	147,351	149,781
September	.....	69,901	127,220	136,870
October	.....	22,924	98,559	91,428
November	.....	48,155	39,745	27,672
December	.....	68,252	36,482	27,779
Total	.....	1,035,660	1,535,852	1,462,556

Total Sales to Dealers in the U. S. and Canada, Plus Overseas Shipments

	1931	1930	1929	1928
January	89,349	106,509	127,580	125,181
February	96,003	126,196	175,148	169,232
March	119,195	135,930	220,391	197,821
April	154,252	150,661	227,718	197,597
May	153,730	147,483	220,277	207,325
June	111,668	97,440	200,754	186,160
July	87,449	79,976	189,428	169,473
August	.....	85,610	168,185	186,653
September	.....	78,792	146,483	167,460
October	.....	28,253	122,104	120,876
November	.....	57,257	60,977	47,587
December	.....	80,008	40,222	35,441
Total	.....	1,174,115	1,899,267	1,810,806

Unit sales of Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, LaSalle and Cadillac passenger and commercial cars are included in the above figures.

Predicts Aero Purchases

NEW YORK, Aug. 10—American air transport lines will buy new equipment, valued at more than $5,000,000, before the close of the year, according to an article by Charles L. Lawrance, president of the Aeronautical Chamber of Commerce of America, Inc., appearing in the August issue of *Western Flying*.

According to Mr. Lawrance, the value of planes purchased by air transport lines during the first five months accounted for 58.9 per cent of the total commercial sales. Mr. Lawrance bases his prediction on a table of "life expectancy," giving the average life of planes employed in transport service. He also takes into consideration the purchases of new equipment during the last five years, the opening of new routes, the extension of existing ones and the expansion of schedules.

Michigan Registrations Fall

DETROIT, Aug. 10—Automobile registrations in Michigan during June totaled 10,653, a decrease of 3268, or 23 per cent, from the May total of 13,921, and a decrease of 4214, or 27 per cent, from the total of 14,867 for June, 1930.

Ford, totaling 3652, showed a decrease of 56 per cent from the June, 1930, figure, and a decrease of 23 per cent from the May figure.

Chevrolet was second with 3077, an increase of 19 per cent over the June, 1930, figure, and a decrease of 25 per cent from the total of 4154 for May.

Pontiac was third with 423, Essex fourth with 399, Buick fifth with 376, and Oldsmobile sixth with 330.

Commercial car registrations totaled 1184 against 1324 in May, and 1412 in June last year. Ford was first with 657, Chevrolet second with 300, and International third with 69.

G.M. July Sales Rise

NEW YORK, Aug. 10 — General Motors dealers in the United States sold 85,054 units to consumers during July, as compared with 80,147 for the corresponding month of last year. Manufacturing divisions sold to dealers 78,723 units, as against 70,716 for the corresponding month last year. Total sales to dealers throughout the world for July totaled 87,449, as against 79,976 a year ago. This is the fourth consecutive month during which total sales exceeded the corresponding month of the previous year.

Federal Motor Truck Co. reports net loss for the first half of the current year of $36,116. This compares with profit of $191,458, or 38 cents a share for the first half of 1930.

Bruce Ford Dies; Held Many Patents

Was General Manager of Electric Storage Battery Until Shortly Before Death

PHILADELPHIA, Aug. 11—Bruce Ford, vice-president, and until recently general manager of the Electric Storage Battery Co., Philadelphia, died yesterday at his Chestnut Hill home. Mr. Ford, who was nearing his fifty-ninth birthday, had been an active figure in the storage battery field for many years. His membership in the Society of Automotive Engineers dated from 1907. He had been connected with the Electric Storage Battery Co. continuously since 1899.

He was born in Brooklyn, N. Y., the son of Captain Edward Lloyd Ford of the publishing firm of J. B. Ford & Co., later Ford, Howard & Hulbert, which published *The Christian Union*, later to become *The Outlook*. He was educated at St. Paul's School, Garden City, L. I., and at the Brooklyn Polytechnic Institute.

After serving two years with the Electric Storage Battery Company, Mr. Ford spent six years at Johnstown, Pa., with the Johnson Company and the Lorain Steel Company, returning to the battery company in 1899 as engineer in charge of development and design. He registered more than fifty patents on inventions in the storage battery field and was responsible for the design of many batteries used by the United States Government in the World War. These included batteries installed in submarines.

Mr. Ford was a director of the Chloride Electrical Storage Co., Ltd., of Manchester, England. He was a member of the American Society of Mechanical Engineers, the Institute of Electrical Engineers, Franklin Institute, the Engineers Clubs of New York and Philadelphia, the Philadelphia Cricket Club and the Old Colony Club. He was a member of the Military Order of the Loyal Legion by inheritance from his English-born father who served as a captain in the Federal Army. He was well known as a fisherman and big game hunter. He was a vestryman of St. Paul's Protestant Episcopal Church in Chestnut Hill.

Surviving are his widow, Mrs. Sophie du Pont Ford, a daughter of the late Victor du Pont of Wilmington, Del.

Balance Sheet and Profit and Loss Statement of Reo Motor Car Co.

Assets

Current		
Cash on hand and in banks	$5,542,754.85	
Government, municipal and marketable securities	2,224,843.09	
Drafts outstanding—sight and foreign	270,424.06	
Receivable—net of reserves	1,580,116.70	
Inventories	7,294,743.19	
Total current assets		$16,912,881.89
Land contracts receivable		166,214.75
Fixed		
Land	$601,357.30	
Buildings	$5,438,322.79	
Machinery and equipment	11,834,956.53	
	$17,273,279.32	
Less: Reserve for depreciation	7,922,062.68	9,351,216.64
Total fixed assets		9,952,573.94
Deferred charges		
Improvements, insurance, rental and taxes		260,637.91
Investments		
Capital stock of the company purchased 99,800 shares	$964,255.61	
Stock of other companies at cost	55,066.00	
Total investments		1,019,321.61
		$28,311,630.10

Liabilities

Current		
Accounts payable	$1,102,057.36	
Accrued payroll	160,883.46	
Federal taxes	4,947.00	
Dividends declared—payable June 1, 1931	200,000.00	
City, state and county taxes	229,436.77	
Miscellaneous	264,529.13	
Total current liabilities		$1,961,853.72
Deferred credits		23,290.35
Capital and surplus		
Authorized 2,000,000 shares at par value of $10.00 each		
Issued 2,000,000 shares at par value of $10.00 each	$20,000,000.00	
Earned surplus	5,853,976.91	
Capital surplus	472,509.12	
Total capital and surplus		$26,326,486.03
		$28,311,630.10

Profit and Loss Statement

Sales:		**Operating profit**	$17,425.33*
Vehicles and parts	$5,691,996.59	**Add:**	
Cost of sales: (Exclusive of manufacturing depreciation)	4,519,622.56	Interest received (net)	89,747.43
Gross profit	$1,172,374.03	**Together**	$72,322.10
Deduct:		**Deduct:**	
Selling, general and administrative expenses	1,213,707.45	Depreciation	223,773.51
Total	$41,333.42*	**Net loss transferred to surplus**	$151,451.41*
Add:			
Other income	23,908.09		
Together	$17,425.33*		

Note (*) indicates loss.

Hilo Plans New Plant

NEW YORK, Aug. 11—Hilo Varnish Corp., Brooklyn, has let contract for the erection of a new varnish plant at Stewart Ave. and Harrison Place, Brooklyn. The plant is to include a three-story and part basement reinforced concrete factory building, and three one-story buildings of structural steel for storage, varnish cooking, and thinning. The contract has been placed with the Turner Construction Co.

Boat Insurance Provided

NEW YORK, Aug. 12—Insurance and rating for private motor boats which are too small to come under the recognition of ordinary marine underwriting, are provided for in a new ruling of the National Association of Casualty and Surety Underwriters.

The plan divides the boats into those of the outboard type and those with permanent motors. The insurance protects those riding in the boat with the permission of the owner, but excludes boats which have been rented or which carry passengers for a fee. It also excludes boats used in races by professionals.

It covers injury to or destruction of property of others, such as boats, piers and bridges, but does not cover injury to employees. The new basic rates are for the standard limits of $5,000 and $10,000 for public liability and $1,000 for property damage. Rates for outboard boats range from $10 for boats under 16 ft. in length with a rated speed of 15 miles an hour to $75 for boats over 16 ft. with a rated speed of 40 miles an hour or more.

For inboard boats the rates range from $25 for boats under 21 ft. with a speed of not more than 15 miles an hour to $350 for boats of 50 ft. and over with a rated speed of 40 miles an hour or more. Estimates of the National Bureau are that there are about 1,500,000 motor boats of all classes in this country, of which only about 3200 are covered by marine insurance written under current rules.

Airplane Output Declines Slightly

First Half Summary Shows Volume of 1606 Units This Year

WASHINGTON, Aug. 12—Airplanes manufactured in the United States during the first six months of 1931 totaled 1608, of which 1069 were for civil use, according to a report prepared by the Aeronautics Branch of the Department of Commerce.

The volume of production was slightly less in the first half of 1931 than in the corresponding half of 1930. Between Jan. 1 and June 30, 1930, the number of airplanes produced was 1684, of which 1177 were for domestic civil use.

Of the airplanes produced from Jan. 1 to June 30, 1931, the total of 1606 was divided as follows: 1069 for civil use, 480 for military delivery, and 57, including civil and military, for delivery to purchasers in foreign countries.

Records of the Aeronautics Branch show that the 1069 airplanes manufactured for domestic civil use were built by 197 companies or individuals. Forty-three manufacturers built 786 of these airplanes under 99 approved type certificates. Nineteen airplanes were approved for license in accordance with the provisions of Group 2, which has been established for aircraft that are manufactured in limited numbers, and which provides for approval without approved-type certificates.

The 197 companies or individuals who manufactured planes during the six months' period included 2 companies which manufactured 100 or more planes each; 2 which built between 50 and 100; 5 which built between 25 and 50; 9 which built between 10 and 24, and 29 which built between 2 and 9. There were 150 companies or individuals who manufactured only 1 airplane each.

A compilation showing the number of planes of each type manufactured during the six months' period appears in the next column.

Plans Apprentice School

DETROIT, Aug. 10—Plans for the building and operation of a Chevrolet apprentice school of mechanical craftsmanship have been announced by W. S. Knudsen, president and general manager of the Chevrolet Motor Co.

The school building, which will provide approximately 10,000 sq. ft. of floor space, will be erected adjacent to the Chevrolet Detroit Gear & Axle Plant. Work on the proposed building will be started in the near future. When completed the school will be equipped with every type of machine necessary to all the finer mechanical arts and crafts, and the work will be directed by C. E. Wetherald, general manufacturing manager of Chevrolet.

The Chevrolet course will be an exact duplicate of the school operated by Chevrolet in Flint. The course as outlined by Mr. Wetherald includes instruction in tool making, die making, pattern making and general machine-shop practice.

United Air Lines Organized

NEW YORK, Aug. 11—United Air Lines, Inc., has been organized as a subsidiary of the United Aircraft and Transport to handle the operation of the various air lines operated by United.

Frederick B. Rentschler, president of United, has been elected chairman of the new company; P. G. Johnson, president; Lester D. Seymour and Paul Henderson, vice-presidents; C. E. Brink, treasurer, and F. G. McCarthy, secretary.

United Air Lines will operate Boeing Air Transport, National Air Transport, Pacific Air Transport and Varney Air Lines.

Summary of Aircraft Production for First Six Months of 1931

Jan. 1 to June 30, 1931

Monoplanes

Open Cockpit (Landplane)

One place	176
Two place	356
*Three place	10
Four place	2
Total open	544

Cabin (Landplane)

One place	2
Two place	23
Three place	7
Four place	78
†Five place	3
Six place	8
‡Seven to ten place	22
§Over ten place	44
Total cabin	187
Convertibles	5
¶Amphibions	11
†Monoplanes, for which data as to place, etc., not available	1
Seaplanes	2
Total monoplanes	750

Biplanes

Open Cockpit (Landplane)

One place	18
Two place	97
Three place	126
Four and five place	14
Total open	255

Cabin (Landplane)

Four to seven place	15
†Amphibions	6
Seaplanes	1
Total biplanes	277
Autogiros	40
Helicopters	2
Military airplane deliveries	480
**Airplanes exported	57
Grand total	1,606

* 2 multi-engine planes.
† 1 multi-engine plane.
‡ 11 multi-engine planes.
§ 36 multi-engine planes.
¶ 4 multi-engine planes.
** Does not include planes listed in the above breakdown or planes exported in 1931 which were manufactured prior to Jan. 1, 1931.

Tax Facts

NEW YORK, Aug. 12—Gasoline taxes ranging from two to seven cents per gallon are now levied by states of the United States, according to a current summary of the American Petroleum Institute. Grouping of states, according to the amount of the tax, follows:

2c—Connecticut, District of Columbia, Missouri, New York, Rhode Island.

3c—California, Delaware, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, New Jersey, North Dakota, Pennsylvania.

4c—Colorado, Indiana, Maine, Maryland, Nebraska, New Hampshire, Ohio, Oregon, South Dakota, Texas, Utah, Vermont, West Virginia, Wisconsin, Wyoming.

5c—Alabama, Arizona, Idaho, Kentucky, Louisiana, Montana, Mississippi, Oklahoma, New Mexico, Virginia, Washington.

6c—Arkansas, Georgia, North Carolina, South Carolina, Tennessee.

7c—Florida.

In Alabama, Louisiana, Missouri and New Mexico additional county and community taxes range in rate from one-half cent to three cents per gallon.

A curious feature of the tax situation, the Institute points out, is that separate display of the amount of the tax is forbidden by law in some states, while others require that the base price of the fuel, the amount of the tax, and the whole cost to the consumer be displayed in markings of equal visibility.

Illinois Sales Improved

CHICAGO, Aug. 10—New car sales in Illinois spurted during July with total sales of 13,874 for the month, as compared with 11,241 for June. Sales for July this year are 3010 less than for the same month last year. The July 1931 total brings the number of new cars sold in Illinois in the first seven months of the year up to 88,179 cars, an average of 12,597 cars a month, as compared with 125,847 new car sales for the seven months period of 1930 or an average of 17,978 sales a month. Cook county reported 7296 new car sales in July, 1931.

Wilkening Adds Space

PHILADELPHIA, Aug. 10—The Wilkening Manufacturing Co., which moved into a new plant at the beginning of this year, has added about 3000 sq. ft. of floor space to the production department at this plant. The company is operating a day and night shift.

Casing Shipments Rose in June

Exceeded May Total But Were Below Last Year's Mark

NEW YORK, Aug. 10—Shipments of pneumatic casings for the month of June amounted to 5,571,886, an increase of 2.9 per cent over May of this year, and 5.3 per cent over June, 1930, according to statistics released today by the Rubber Manufacturers Association, Inc.

The organization reports production of pneumatic casings for June to have been 5,672,463 units, representing practically no change as compared with May of this year, although it was 10.7 per cent over June a year ago.

Pneumatic casings on hand June 30 amounted to 10,447,210 units, an increase of 1.3 per cent over May, although 21.3 per cent below June 30, 1930.

The figures are as follows:

	Pneumatic Casings Shipments	Production	Inventory
June, 1931..	5,571,886	5,672,463	10,447,210
May, 1931..	5,415,171	5,678,754	10,312,320
June, 1930..	5,293,742	5,122,260	13,277,005

Studebaker Plans for Radio

SOUTH BEND, Aug. 11—Current types of Studebaker closed cars have been designed with the requirements of clear radio reception in mind, according to an announcement from the Studebaker factory. Philco-Transitone, volume-control, automobile radio installations will be made at the Studebaker factory at buyer's option. Provision for this includes the use of devices on the electrical system of the vehicle to prevent static interference with the operation of the radio set.

Curtiss Adopts Mark

NEW YORK, Aug. 10—Curtiss-Wright Corp. has adopted a trademark consisting of a Persian orange arrowhead, behind which appears the name "Curtiss-Wright," placed on a round black background, the whole surrounded with a black circle.

Chrysler Adds 40 Dealers

DETROIT, Aug. 10—Forty new dealers were added to the dealer organization of Chrysler Sales Corp. in the first two weeks of July, according to a statement authorized by J. W. Frazer, general sales manager.

Chrysler Adds Imperial Type

DETROIT, Aug. 10—A new convertible sedan designed by Le Baron has been added to the Chrysler Imperial Eight line. It lists at $3,995.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Olympia Passenger Car Show, London .....Oct. 15-24

Olympia Truck Show, London..Nov. 5-14

Passenger Car Show, Glasgow..Nov. 13-21

Motorcycle Show, London..Nov. 30-Dec. 5

CONVENTIONS

S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio .....Sept. 1-3

Eastern States Exposition, Springfield, Mass. .....Sept. 20-26

American Welding Society, Boston, Mass. .....Sept. 21-25

American Electric Railway Assn., Atlantic City, N. J.....Sept. 26-Oct. 2

S.A.E. National Production Meeting, Detroit .....Oct. 7-8

National Safety Council, Chicago, Ill. .....Oct. 12-16

Society Industrial Engineers, Pittsburgh, Pa. .....Oct. 14-16

Transportation Meeting, S.A.E., Washington, D. C. .....Oct. 27-29

American Chemical Society, Buffalo, Aug. 31-Sept. 4

American Society Mechanical Engineers (General Meeting), Kansas City .....Sept. 7-9

W. Va. Motor Transportation Assn., Charleston .....Sept. 11

Society for Elec. Development, New York City .....Sept. 11

Steel Founders Society, Chicago..Sept. 17

American Institute Mining and Metallurgical Engineers—Iron and Steel Division, Boston .....Sept. 21-24

American Society for Steel Treating (National Metal Exposition), Boston .....Sept. 21-25

American Society Mechanical Engineers—Machine Shop Practice, Boston .....Sept. 21-26

American Gear Mfg. Assn., Pittsburgh .....Oct. 15-17

National Hardware Assn., Chicago, Oct. 19-22

American Iron and Steel Institute, New York City .....Oct. 23

American Railway Assn.—Motor Transport Division, Chicago.....Oct. 27-28

American Society Mechanical Engineers—Annual meeting, New York City .....Nov. 30-Dec. 4

American Roadbuilders Association, Detroit, Mich. .....Jan. 11-14, 1932

Cincinnati Plans 3 Offices

CINCINNATI, Aug. 11—The Cincinnati Milling Machine Co. has announced that it will establish direct sales representation in the Detroit, Chicago, Cleveland and Cincinnati territories, in conjunction with Cincinnati Grinders, Inc. Offices will shortly be opened in Cleveland, Detroit and Chicago.

Waterbury Develops Plastic

NEW YORK, Aug. 10—Waterbury Button Co., Waterbury, Conn., has developed a new plastic which can be supplied to the automotive trade in pastel shades and colorings.

Graham Plans Retail Action

Will Participate in Compensation of Dealer Sales Force

DETROIT, Aug. 10—Graham-Paige Motors Corp. has notified its dealers that it will participate in the compensation of salesmen. The plan is believed to be the first in the industry, and employment for hundreds of additional salesmen in the United States and Canada, at a regular salary plus commission, will be provided under it, enabling dealers to equip an expert force for selling their products in the future.

In making the announcement, C. W. Matheson, general sales manager, said in part: "Factory participation in hiring and paying of salesmen was decided on as a part of the company's comprehensive plan to build up sales activities now, during the slow season, to be ready for improved business in the fall and for the fruition of the company's program for greatly increased activity before the end of the year."

Truck Regulation Expected

TORONTO, ONT., Aug. 11—A general increase in the freight rates of all highway transport trucks, with penalties for infraction of the regulations against rate cutting, is expected following a circular containing the names of truck owners who do business on the highways of the province, to be issued shortly by the Department of Highways. It is expected that classification for freight purposes will follow very largely the present classification used by the steam railways, with a greater parity of rates. The steam roads have been reducing freight and passenger rates to meet the competition of automobile and truck, and in cases have provided a much improved business from train sheds to warehouse.

State Defers Inspection

HARRISBURG, PA., Aug. 12—There will be no general inspection of motor vehicles in the state of Pennsylvania during the autumn, according to Benjamin G. Eynon, commissioner of motor vehicles. Revisions in the Motor Vehicle Code of the state, which become effective January 1, provide for the authorization of new official inspection stations which shall be able to perform all the inspection functions required by the code.

Chrysler Managers Meet

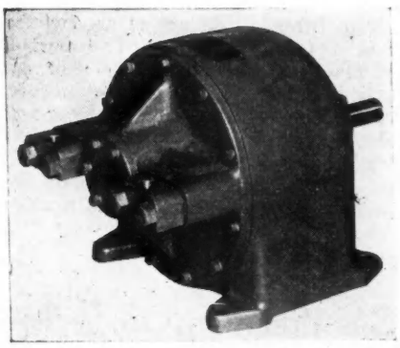
DETROIT, Aug. 10—District managers of the Chrysler Sales Corp. attended a conference with factory officials here Tuesday and Wednesday of last week.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Oilgear Constant Displacement Motor

A MAXIMUM pressure range of 1500-1750 lb. per sq. in. is available with the type RQ-2 motor recently placed on the market by the Oilgear Co., Milwaukee, Wis. When used in combination with an Oilgear variable delivery pump will provide an ideal variable speed transmission.



These units can be applied to conveyors, paper mill drives and other machinery where smooth rotary motion and variable speed are essential. Large grinding machine tables can also be reciprocated with these units by means of a rack and pinion.

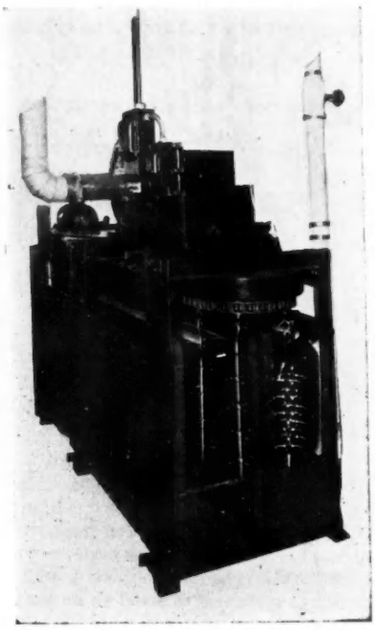
A series of speed ratios practically independent of variations in load are available with the Oilgear transmission. Any constant speed source of power can be used to drive the Oilgear pump, while the type RQ-2 motor shaft can be varied from zero to maximum, at all times under the control of a single operating lever.

The displacement is 2.1 cu. in. per revolution. Maximum speed 860 r.p.m. Net weight 200 lb.

Metalwash Drying Machine for Racked Parts

A LOW heat, continuous drying machine has been perfected by the Metalwash Machinery Co., Inc., New York, N. Y., to take care of work coming from cold or hot rinse tanks, requiring quick drying of miscellaneous metal parts, replacing sawdust drying. It is a relatively small, compact unit, arranged in two drying chambers for either hot or combination cold and hot blast drying. The overhead single chain return conveyor, which is mounted on top of the blast chambers, carries the work through the blast tunnels, entering at the left and returning at the right to the same operator.

The tunnels are formed by "U" shaped blast chambers containing steam radiating fin coils. An exhauster of suitable capacity creates a certain pressure in the blast chambers, which forces the hot air against the passing work, thus blowing off the water by mechanical force while the heat absorbs the remaining moisture. To eliminate water spots on highly polished material, heat in the left



chamber may be shut off to prevent actual drying, but permitting the cold blast to drive off all excess liquid until the work has reached the heated return tunnel, where the remaining moisture is evaporated.

Cutting and Welding Torch

AN entirely new cutting and welding torch, known as the Milburn type RIF-A, has been announced by the Alexander Milburn Co., Baltimore, Md.

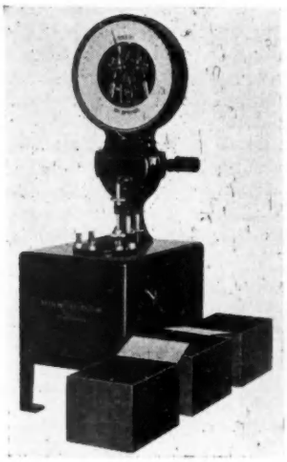
The principal parts of this torch are of forged bronze and the tubes nickel silver, assuring greater strength, rigidity and long life. It has a patented leak-proof, high-pressure valve which is readily accessible, and seats may be renewed without disassembling handle or other parts.

Another feature is that the head is designed to take conical seated tips Nos. 1RIF to 8RIF, which will also fit Purox type E cutting torch.

The RIF-A torch may be converted from a cutting torch into a welding torch by use of an adapter, No. 630, made under Milburn patent rights. This adapter is designed to take Milburn standard FX welding tips and tips similar to Milburn type FX welding tips. These Milburn FX tips will also fit Purox welding torches, types 10 and 20, and Prest-O-Weld welding torch, type W101.

Toledo Spring Testing Gage

A NEW auto-gage for compression coil springs has been placed on the market by Toledo Precision Devices, Inc., a subsidiary of the Toledo Scale Co., Toledo, Ohio. In operation, each spring is compressed to a predetermined length, and the expansive force automatically indicated in pounds on a large dial. Springs are then discharged through a swinging chute, those of the proper stiffness dropping into one bin, those which are too stiff into another bin, and those not stiff enough into a third bin.



The gage may be set to compress and test springs of different lengths and different degrees of stiffness, and sort them within any desired tolerance. The machine can be readily adjusted to make a tolerance as close or as liberal as desired.

(*Turn to page 262, please*)

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

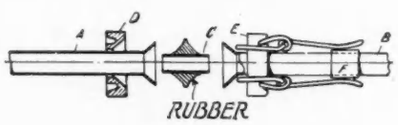
Kysor Hot-Water Heater for Buses

KYSOR HEATER CO., Cadillac, Mich., is manufacturing a hot-water heater for buses for which it is claimed that it will deliver 250 cu. ft. of free air per minute heated to 150 deg. F., the water leaving the engine at 175 deg. F. A high-velocity air stream is forced through a long radiator core by an electrically driven blower. The stream of heated air is directed straight down the aisle, so that passengers are not annoyed by it. Aside from the radiator core, which is of standard construction, all parts of the heater are of either aluminum or stainless steel.

Quick-Acting Tubular Joint

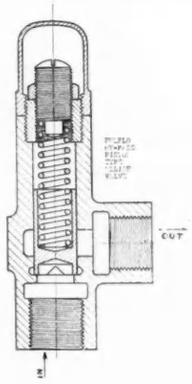
A NEW type of tubular joint which is said to have proved very reliable under vibration and to have been approved by the German Research Institute for Aviation, not only for oil lines but also for fuel, water and air lines, has been developed by Hans Julius Keitel of the Dornier Works of Friedrichshafen, Germany. It is referred to as a quick-acting joint and can be connected up and detached without the use of tools. Opening or closing of the joint does not stress the connected parts in any way. No screw threads are involved, and neither soldering nor welding is required.

The parts of the joint are shown in the drawing herewith, which is reproduced from *Automobiltechnische Zeitschrift*. A and B are the two pieces of tubing to be connected, which are expanded in conical form at their ends as shown. Between the ends of these tubes is inserted a short piece of tubing C, which is surrounded by a rubber ring of conical form, against which the two tube cones are pressed. The two rings D and E are then drawn together by what is known as a bottle stopper wire lock, pressing them against the rubber cone, which assures an absolutely tight joint, it is claimed. The wire locks, which are made of aluminum, are very light. For instance, a lock for a tube ⅛ in. internal diameter weighs only 1/150 lb. and withstands pressures of up to 15,000 lb. per sq. in.



"Fulflo By-Pass Valve"

A NON-CHATTERING piston type oil relief valve, or by-pass, has been placed on the market by Fulflo Specialties Co., Blanchester, Ohio. It is made in pipe sizes from ⅜ in. to 1¼ in., and suitable for pressures from 20 lb. to 120 lb. Adjustment can be made by removing the cap and turning the adjustment screw at top. The cylindrical piston seat closes off the port in a shearing manner, thereby relieving pounding or chattering. An important use of this valve is in connection with oil hydraulic pumping units where a specific pressure is desired to be maintained, especially on machine tool hydraulic mechanism, oil burning equipment, ram, presses, etc.



G. E. Welding Sets Have Improvements

AN improved line of single-operator welding sets has been placed on the market by the General Electric Co., Schenectady, N. Y. This has been designated the WD-20 line, covering the 100, 200, 300, 400 and 600-ampere ratings respectively.

It includes both portable and stationary sets, the basic form being stationary with but a slight change needed to make it portable. Types include those for operation on either alternating or direct current at all standard voltages and, in the case of alternating current, standard frequencies and 2 and 3-phase gasoline-engine-driven sets will also be available.

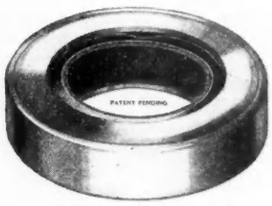
Among the principal advantages of the line are the use of two-bearing construction on the a-c. types up to 600 amperes, compactness and light weight, and greatly improved welding characteristics. The sets are self-excited with a tapped series field for major current adjustments and a shunt field rheostat giving duplex voltage control.

Thermoid Asbestos Wicking

THE Thermoid Rubber Co., Trenton, N. J., has added asbestos wicking to its line of automotive products. This wicking consists of numerous asbestos threads that are firmly twisted into a ¼-inch wicking. The method of manufacture employed is said not only to insure an unvarying diameter, but to enable the mechanic, by using one or more threads, to make a packing of any diameter from 1/64 to ¼ in. Wicking of this type is used for packing exhaust-manifold and muffler joints.

Gits Precision Oil Seals

AN improved oil seal is announced by Gits Bros. Mfg. Co., Chicago. These seals are made of heavy sheet metal and are accurately machined on the outside to insure a minimum of eccentricity and an oil-tight joint. They are made to seal ball, roller and plain sleeve bearing inclosures. The leather washer is tapered where the pressure of the flat spring clamping ring is applied. The flexibility of the tapered leather requires only slight pressure to contract the leather and provide an effective seal with a minimum of friction on the shaft. It is claimed that the sharp edge of the tapered washer sheers the oil film, thus preventing the escape of oil. The washers are made of a leather specially tanned to increase its heat-resisting qualities. These oil seals are assembled units that come ready to install.



(*Turn to page 264, please*)

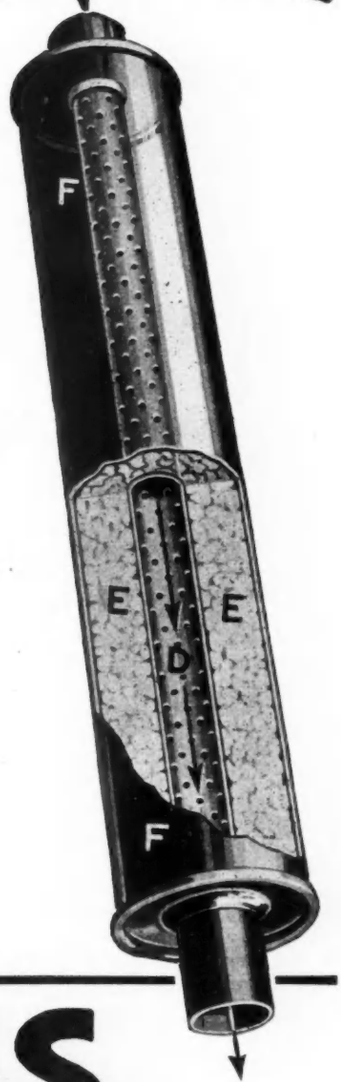
HORSES that Pull No Load HINDER Those that do their share

INCREASED engine output—as much as seven horsepower saved, is the basic reason for the acceptance of Burgess Mufflers as standard equipment on many of America's finest cars.

When quiet is wanted, it can be obtained, and with the Burgess Full Power Muffler it can be had without loss in horsepower due to increased back pressure. The Burgess Muffler causes no more back pressure than would an equivalent length of straight pipe, yet its silencing ability is pronounced.

As the illustration shows, the muffler consists of three principal parts: a perforated pipe, D, surrounded by a sound absorbing material E, which is enclosed in a metal covering F. The exhaust gases from the engine pass straight through the perforated pipe D, but the exhaust noises are absorbed, assuring satisfactory silencing.

Burgess engineers specialize in the study of noises in automobiles, aeroplanes, air ducts, buildings, ventilators, motor boats—in fact, acoustics in general. Our engineers are ready to help solve your noise problems.



BURGESS BATTERY COMPANY
111 WEST MONROE ST.
CHICAGO

BURGESS

ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Oilgear Variable Delivery Pumps

TWO high-pressure, one-way variable delivery pumps have been added by the Oilgear Co., Milwaukee, Wis. Type QR-2 is designed for use in connection with cylinders and machines performing broaching, assembling, grinding, honing, planing, drilling, boring and similar work where it is essential to have a smooth and

positive straight-line motion. Also in connection with Oilgear constant displacement motors as variable speed transmissions.

At full stroke and load this pump has an efficiency of 90 per cent. A smooth and positive volume of oil is delivered under any pressure within the maximum capacity of the unit. The power input is always in direct proportion to force required to perform the operation. Overloading the pump, work and tools is prevented by an internal relief valve which can be adjusted according to the force required. Working parts have both flood and pressure lubrication. All heavy thrusts are carried on roller and ball bearings, and the working parts are easily accessible. A convenient lever on the face of the pump controls the volume of oil delivered. Flanged pipe connections are bolted to the face of the pump. An internal gear pump supercharges and lubricates the high-pressure pump at all times.

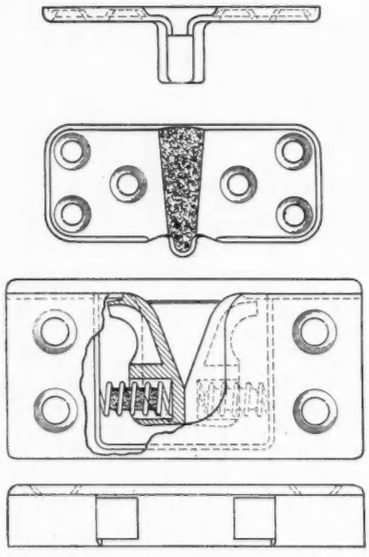
The type QWR-2 has the additional feature of constant and variable pressure control. It is recommended for use in connection with cylinders and machines performing assembling, squeezing, clamping and riveting work and in similar machines and processes where it is necessary or desirable to hold the work under a predetermined pressure for a period of time. Also in connection with Oilgear constant displacement motors as variable speed transmissions.

General specifications are the same for both units. Maximum pressure, 1500 lb. per sq. in.; maximum speed, 860 r.p.m.; maximum hp., 7, but a 3 or 5-hp. constant-speed motor is sufficient for most applications. Weight without oil casing as shown, 375 lb. net.

This company is also building two new pumps having a maximum working pressure of 2500 lb. per sq. in. The construction, operating characteristics and other specifications are the same as those for types QR-2 and QWR-2.

Mitchell Dovetail

A CUSHION for automobile doors known as the Mitchell rigid type all-metal dovetail has been placed on the market by the Mitchell Specialty Co., Philadelphia. It consists of two parts, one of which is fastened by screws to the door and the other to the door frame. Both parts are made of pressed steel. The part that is secured to the door has a hollow wedge formed on it, within which there is a wick

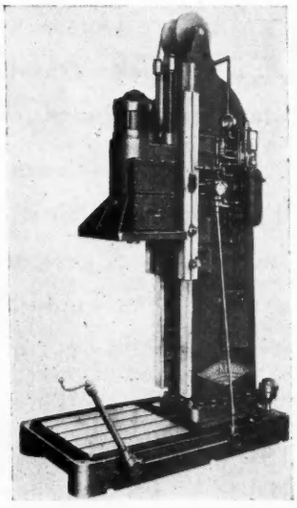


which is impregnated with oil and graphite. When the door is thrown closed this wedge enters between two spring-backed jaws in the part fastened to the door frame, forcing these jaws apart. A large part of the kinetic energy of the door as it comes to a stop suddenly is thus taken up by the springs of the "dovetail" and the usual slamming is prevented. The energy stored in the springs helps to open the door.

Owing to the provision of a lubricating wick, already referred to, wear is said to be very slight; it is, moreover, confined to the jaws of the part fastened to the frame, and we understand that these can be cheaply replaced.

Multiple Spindle Drill

A NEW heavy-duty machine for multiple spindle drilling or boring operations has been developed by the Rockford Drilling Machine Co., Rockford, Ill. It provides the advantages of low-cost high production usually secured only with single-purpose equipment, but incorporating a flexibility adapting it to many jobs.



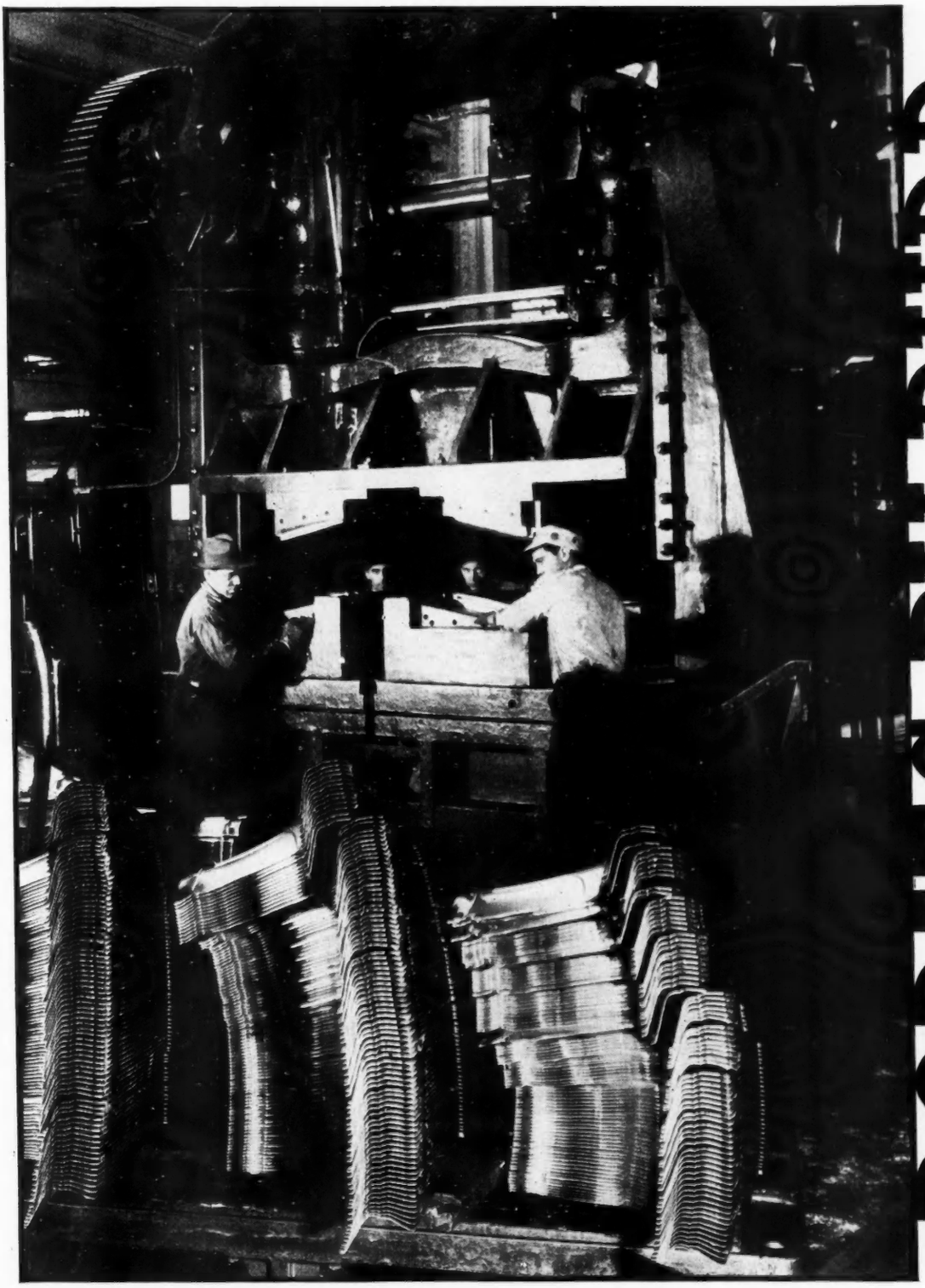
This is accomplished by bolting to the face plate of machine head different auxiliary heads or spindle-units with the proper number of spindles on correct centers to suit each job. Spindle-units are quickly and easily applied.

The motor drives through spur reduction gearing to main drive spindle. Pick-off gears permit wide range of spindle speeds. Drive is mounted in Timken taper roller bearings and oil bath lubrication provided.

The head is hydraulically operated. Operator engages control and following functions automatically take place: Rapid traverse to a predetermined point, engagement of correct feeding rate to predetermined point, automatic rapid return to starting position. If desired, a second rate of feed is incorporated in automatic cycle, also a "dwell" if facing is to be done. The head is counterbalanced and counterbalance weight is easily varied to suit conditions. 24 in. of head travel is available.

(Turn to page 266, please)

Ninety-nine out of a hundred cars sold by a maker may be free from annoying body squeaks or noises. Yet let one offend in that respect and the reputation of the entire line may suffer. Budd achieves unequalled quietness in the one-piece body by simplicity and uniformity. There is little or no chance of error. Only eight major parts, flash welded into a jointless, one-piece body. Where there are no joints, there can be no squeaks, no rattles.



★BODIES BY BUDD★

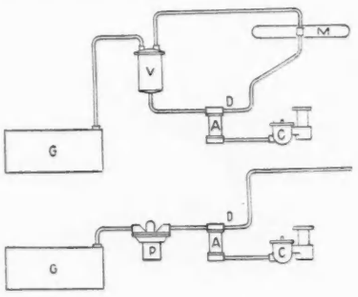
Originators of the All-Steel Body. Supplied to manufacturers in the United States, Great Britain, France and Germany.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Jones Vaporite

A DEVICE designed to eliminate trouble from vapor lock in the fuel system of motor vehicles has been invented by Joseph W. Jones and is being sold by the Jones Motrola Sales Company of New York. It is attached to the carburetor and is said to automatically create a suction on the gasoline line, drawing gasoline from the vacuum tank to the carburetor bowl.



Any gas and air that may be in the gasoline coming from the tank are removed before the fuel reaches the float bowl. In addition, an ample reserve of gasoline is provided close to the carburetor, cushioned by an air dome, which provides the extra supply required for starting and acceleration. The device is said to increase the capacity of the vacuum tank or the fuel pump by preventing them from becoming air or vapor-bound and eliminating foaming in the carburetor bowl at high speeds.

The Vaporite is a small cylindrical device with tube connections at top and bottom. The connections with vacuum tank and pump-feed installations are shown in the drawings herewith. With a vacuum feed system the gas removed from the fuel by the Vaporite A is led into the inlet manifold of the engine, while with a pump system it is discharged into the atmosphere.

Improvements in Power Presses

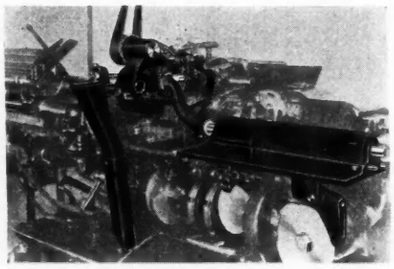
IMPROVEMENTS in the design of power presses built by the Farrel-Birmingham Company, Inc., Ansonia, Conn., are now available, according to a recent announcement. This line now includes anti-friction bearings as standard equipment for the drive-shaft of all geared presses. Wherever conditions permit, a bearing of anti-friction type is placed on each side of the main pinions. With this construction, considerably less power is required.

Another feature is a multiple disk friction clutch with magnetic control and magnetic brake. Presses equipped with magnetic clutch and brake have push-button control, with start and stop buttons for one or more operators, and at any point or as many points about the press as may be necessary or desired. A selector switch and inching control enable the operator to run the press either continuously, a stroke at a time, or to inch the press under perfect control for special working conditions or for setting dies. A positive stop on the up stroke makes repeating impossible, except when continuous operation is selected by the operator pushing the proper button. Stop buttons will stop the press instantly at any point of the stroke under any of the selected operations.

A rheostat may be used in series with the magnet to control the clutch to a given horsepower. This feature is direct protection against breakage of press parts due to overloading of the press, and provides added safety to the operator.

Nut Tapping Attachment

A NUT tapping attachment for B&S screw machines has been announced by the Brown & Sharpe Mfg. Co., Providence, R. I. It is made in three sizes for use on the Nos. 00, 0 and 2 machines, both the regular and high-speed types; also on the screw-threading machines. It is of the second operation type and is fastened to the machine above the front cross slide.

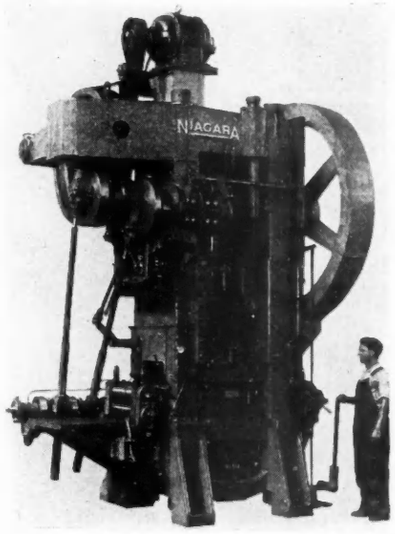


A transporting arm takes the part, after it has been cut off at the main spindle of the machine, carries it to an intermediate position where a counter-sinking operation is done on the back end and then to the tapping unit proper. Here the nut is placed in a revolving chuck and automatically fed over a bent shank tap. As successive nuts are fed along the tap, those previously tapped are pushed along the shank and dropped into a chute which leads to the work pan. The tap is held in position by the nuts, which, as they are fed along the shank, bear on two bushings.

On belt-driven machines the attachment is driven from overhead or by an attachment driving stand, while on motor-driven machines it is driven by an individual motor.

Niagara No. 512 Press

A LARGE single-crank press of new design equipped with a special two increment roll feed has been placed on the market by the Niagara Machine & Tool Works, Buffalo, N. Y. The specification required the punching of a predetermined number of groups of holes in strip stock, the distance between the groups to be uniform, but the space between the last group and the end of the sheet to be greater. This necessitated after the last stroke an automatic change in the feed from the standard increment to a longer one.



The strip stock is of considerable width and is previously cut to the correct length. The strip to be punched is inserted between the roll feed and through the opening in the press housing at the right. The operator engages the clutch. The press, die and roll feed automatically produce the required number of perforations evenly spaced. Then the long feed comes into action and not only gives the necessary broad unpunched area at the end of the strip but carries the last edge of the strip clear of the left-hand roll feed. The press then stops automatically.

To maintain high production, the press is single-geared and operates at 42 strokes per minute.